TEACHER GUIDE

7th –8th Grade

Includes Student Worksheets

Math

- Answer Keys
- Weekly Lesson Schedule
- Worksheets
- Quizzes and Test

[JR HIGH – YEAR 2 – TEACHER]

BOOK 2 PRINCIPLES OF MATHEMATICS

BIBLICAL WORLDVIEW CURRICULUM

MASTERBOOKS® CURRICULUM

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PRINCIPLES OF MATHEMATICS BOOK 2

MASTERBOOKS® CURRICULUM

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

Based on and designed to go with *Principles of Mathematics Student Textbook* (Book 2). Please see the *Student Textbook* for further information and sources.

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.

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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 early 1900 math textbooks, often with significant adaptation. The sources are listed here for your reference.

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.

> Worksheet 2.3, problem 3c; Quiz 1, problems 3a and 5c; Worksheet 5.4, problems 2a and 2b; Quiz 4, problems 1a–1b; Test 1, problem 1a–1b; Worksheet 6.1, problem 2; Worksheet 6.3A, problems 1 and 2; Worksheet 6.3B, problems 1a and 1c; Quiz 5, problem 1c; Worksheet 7.1, problems 4c and 4d; Worksheet 7.2, problem 5; Worksheet 7.3, problem 3; Quiz 6, problem 3; Worksheet 11.6, problems 1a and 1c; Test 2, problem 3d; Worksheet 17.5, problem 4; Worksheet 20.3, problem 5a; Worksheet 21.3C, problem 3

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.

> Worksheet 1.4, problem 3; Worksheet 3.7, problem 5; Worksheet 5.2, problem 3; Worksheet 5.3, problem 3; Worksheet 5.5, problem 1a; Worksheet 11.6, problem 9; Worksheet 12.1, problem 5; Worksheet 13.4, problems 3b–3c; Worksheet 14.7, problem 2, Quiz 16, problem 4; Worksheet 18.4, problem 6; Worksheet 20.4, problem 3; Worksheet 21.3C, problem 2

This problems were adapted from Joseph Victor Collins, *Practical Algebra: First Year Course* (New York: American Book Co., 1910). Available on Google Books.

> Worksheet 3.2, problem 5b; Worksheet 5.6, problems 6a–6c; Worksheet 7.4, problem 5; Worksheet 9.4, problem 1; Worksheet 10.1, problem 4; Worksheet 10.3, problem 3; Worksheet 11.3, problem 3b–3d; Worksheet 11.4, problem 5c; Worksheet 12.3, Problems 3 and 4

Table of Contents

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 Hannon is a homeschool graduate and homeschool mom. 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 two decades 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.

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 accellerated speed.

Course Description

This a Book 2 of a two-book math course designed to give students a firm mathematical foundation, both academically and spiritually. Not only does the curriculum build mathematical thinking and problem-solving skills, it also shows student how a biblical worldview affects our approach to math's various concepts. Students learn to see math, not as an academic exercise, but as a way of exploring and describing consistencies God created and sustains. The worldview is not just an addition to the curriculum, but is the starting point. Science, history, and real life are integrated throughout.

Course Objectives

Students completing this course will:

- Discover how a biblical worldview affects how we view and use math, and how math's very existence points us to a faithful Creator we can trust
- Be equipped to use the math they learn as a useful tool in a wide range of settings, learning to see math as much more than a textbook exercise
- Have a solid foundation for algebra, understanding the core concepts of working with unknowns, equalities, inequalities, functions, and graphing relationships
- Grasp core concepts in statistics and probability, including line graphs and trends, scatter graphs and correlation, stem-and-leaf plots, averages, independent events, dependent events, and the fundamental counting principle
- Work with exponents and square roots, including negative exponents, scientific notation, finding square roots, and the Pythagorean theorem
- Get a glimpse of how math applies in other areas, including trigonometry, sets, and consumer math

Supplies Needed

- ***Principles of Mathematics Student Textbook (Book 2)***
- **Binder with Lined 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 the binder during the course. They can also use their binder to store their completed worksheets, if desired.
- **Calculator** — Students need a calculator that is able to handle scientific notation; has at least a 10-digit display; and has exponent (y^x), square root ($\sqrt{}$), sine (SIN), cosine (COS), and tangent (TAN) buttons. Graphing calculators should not be used in this course.
- **Graph Paper** — Students will need graph paper to draw coordinate graphs.
- **Ruler** — Students will need a ruler to draw straight lines when graphing.
- **Additional Paper** (if needed) — Students should have extra paper available in case they need more room to complete a problem.
- **Index Cards** (optional)— Making flashcards of definitions or formulas can be a helpful way to learn and review the material. Students are encouraged to use index cards to make flashcards as needed.

Additional Resources and Course Notes

- Please see http://www.christianperspective.net/math/pom2 for links to helpful online resources, along with additional notes and information related to this course. There is also a way to ask questions there.

Suggested Daily Schedule

(to complete Book 2 in a school year)

Date	Day	Assignment	Due Date	✓	Grade
First Semester—First Quarter					
Week 1	Day 1	Lesson 1.1 (*Student Textbook*, pages 13–18) Worksheet 1.1 (*Teacher Guide,* pages 21–22)			
	Day 2	Lesson 1.2 (*Student Textbook*, pages 18–22) Worksheet 1.2 (*Teacher Guide*, pages 23–24)			
	Day 3	Lesson 1.3 (*Student Textbook*, pages 22–24) Worksheet 1.3 (*Teacher Guide*, pages 25–26)			
	Day 4	Lesson 1.4 (*Student Textbook*, pages 24–26) Worksheet 1.4 (*Teacher Guide*, pages 27–28)			
	Day 5	Lesson 1.5–1.6 (*Student Textbook*, pages 27–31) Worksheet 1.5 (*Teacher Guide*, pages 29–30)			
Week 2	Day 6	Lesson 2.1 (*Student Textbook*, pages 33–35) Worksheet 2.1(*Teacher Guide*, page 31)			
	Day 7	Lesson 2.2 (*Student Textbook*, pages 36–38) Worksheet 2.2 (*Teacher Guide*, pages 33–34)			
	Day 8	Lesson 2.3 (*Student Textbook*, pages 38–41) Worksheet 2.3 (*Teacher Guide*, pages 35–36)			
	Day 9	Lesson 2.4 (*Student Textbook*, pages 41–46) Worksheet 2.4 (*Teacher Guide*, pages 37–38)			
	Day 10	Lesson 2.5 (*Student Textbook*, pages 46–52) Worksheet 2.5 (*Teacher Guide*, pages 39–40)			
Week 3	Day 11	Lesson 2.6 (*Student Textbook*, pages 53–57) Worksheet 2.6 (*Teacher Guide*, pages 41–42)			
	Day 12	Lesson 2.7 (*Student Textbook*, page 58) Study Day			
	Day 13	**Quiz 1** (*Teacher Guide*, pages 309–310)			
	Day 14	Study Day*			
	Day 15	Study Day*			
Week 4	Day 16	Lesson 3.1 (*Student Textbook*, pages 59–61) Worksheet 3.1 (*Teacher Guide*, pages 43–44)			
	Day 17	Lesson 3.2 (*Student Textbook*, pages 61–64) Worksheet 3.2 (*Teacher Guide*, pages 45–46)			
	Day 18	Lesson 3.3 (*Student Textbook*, pages 64–68) Worksheet 3.3 (*Teacher Guide*, pages 47–48)			
	Day 19	Lesson 3.4 (*Student Textbook*, pages 68–70) Worksheet 3.4 (*Teacher Guide*, pages 49–50)			
	Day 20	Lesson 3.5 (*Student Textbook*, pages 70–72) Worksheet 3.5 (*Teacher Guide*, pages 51–52)			

* Use these study days to spend extra time reviewing any concepts covered in the first two chapters that need more review. The first two chapters reviewed many foundational concepts; it's important to be comfortable with them before continuing.

Suggested Daily Schedule

(to complete Book 2 in a school year)

Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 21	Lesson 3.6 (*Student Textbook*, pages 72–75) Worksheet 3.6 (*Teacher Guide*, pages 53–54)			
	Day 22	Lesson 3.7 (*Student Textbook*, pages 75–79) Worksheet 3.7 (*Teacher Guide*, pages 55–56)			
	Day 23	Lesson 3.8 (*Student Textbook*, pages 79–80) Study Day			
	Day 24	**Quiz 2** (*Teacher Guide*, pages 311–312)			
	Day 25				
Week 6	Day 26	Lesson 4.1 (*Student Textbook*, pages 81–83) Worksheet 4.1 (*Teacher Guide*, pages 57–58)			
	Day 27	Lesson 4.2 (*Student Textbook*, pages 83–86) Worksheet 4.2 (*Teacher Guide*, pages 59–60)			
	Day 28	Lesson 4.3 (*Student Textbook*, pages 86–88) Worksheet 4.3 (*Teacher Guide*, pages 61–62)			
	Day 29	Lesson 4.4 (*Student Textbook*, pages 89–90) Worksheet 4.4 (*Teacher Guide*, pages 63–64)			
	Day 30				
Week 7	Day 31	Lesson 4.5 (*Student Textbook*, pages 91–93) Worksheet 4.5 (*Teacher Guide*, pages 65–66)			
	Day 32	Lesson 4.6 (*Student Textbook*, pages 93–94) Study Day			
	Day 33	**Quiz 3** (*Teacher Guide*, pages 313–314)			
	Day 34	Lesson 5.1 (*Student Textbook*, pages 95–101) Worksheet 5.1A (*Teacher Guide*, pages 67–68)			
	Day 35	Worksheet 5.1B (*Teacher Guide*, pages 69–70)			
Week 8	Day 36	Lesson 5.2 (*Student Textbook*, pages 101–105) Worksheet 5.2 (*Teacher Guide*, pages 71–72)			
	Day 37	Lesson 5.3 (*Student Textbook*, pages 106–108) Worksheet 5.3A (*Teacher Guide*, pages 73–74)			
	Day 38	Worksheet 5.3B (*Teacher Guide*, pages 75–76)			
	Day 39	Lesson 5.4 (*Student Textbook*, pages 108–110) Worksheet 5.4 (*Teacher Guide*, pages 77–78)			
	Day 40	Lesson 5.5 (*Student Textbook*, pages 111–115) Worksheet 5.5 (*Teacher Guide*, pages 79–80)			
Week 9	Day 41	Lesson 5.6 (*Student Textbook*, pages 115–116) Study Day			
	Day 42	**Quiz 4** (*Teacher Guide*, pages 315–316)			
	Day 43	Worksheet 5.6 (*Teacher Guide*, pages 81–84)			
	Day 44	Study Day			
	Day 45	**Test 1** (*Teacher Guide*, pages 347–348)			

Suggested Daily Schedule

(to complete Book 2 in a school year)

Date	Day	Assignment	Due Date	✓	Grade
First Semester—Second Quarter					
Week 1	Day 46	Lesson 6.1 (*Student Textbook*, pages 117–120) Worksheet 6.1 (*Teacher Guide*, pages 85–86)			
	Day 47	Lesson 6.2 (*Student Textbook*, pages 121–124) Worksheet 6.2A (*Teacher Guide*, pages 87–88)			
	Day 48	Worksheet 6.2B (*Teacher Guide*, pages 89–90)			
	Day 49	Lesson 6.3 (*Student Textbook*, pages 124–128) Worksheet 6.3A (*Teacher Guide*, pages 91–92)			
	Day 50	Worksheet 6.3B (*Teacher Guide*, pages 93–94)			
Week 2	Day 51	Lesson 6.4 (*Student Textbook*, pages 128–130) Worksheet 6.4 (*Teacher Guide*, pages 95–96)			
	Day 52	Lesson 6.5 (*Student Textbook*, pages 130–132) Study Day			
	Day 53	**Quiz 5** (*Teacher Guide*, pages 317–318)			
	Day 54	Lesson 7.1 (*Student Textbook*, pages 133–136) Worksheet 7.1 (*Teacher Guide*, pages 97–98)			
	Day 55	Lesson 7.2 (*Student Textbook*, pages 136–139) Worksheet 7.2 (*Teacher Guide*, pages 99–100)			
Week 3	Day 56	Lesson 7.3 (*Student Textbook*, pages 140–141) Worksheet 7.3 (*Teacher Guide*, pages 101–102)			
	Day 57	Lesson 7.4 (*Student Textbook*, pages 141–143) Worksheet 7.4 (*Teacher Guide*, pages 103–104)			
	Day 58	Lesson 7.5 (*Student Textbook*, pages 143–145) Worksheet 7.5 (*Teacher Guide*, pages 105–106)			
	Day 59	**Quiz 6** (*Teacher Guide*, page 319)			
	Day 60	Lesson 8.1 (*Student Textbook*, pages 147–149) Worksheet 8.1 (*Teacher Guide*, pages 107)			
Week 4	Day 61	Lesson 8.2 (*Student Textbook*, pages 149–150) Worksheet 8.2 (*Teacher Guide*, pages 109–110)			
	Day 62	Lesson 8.3 (*Student Textbook*, page 151–153) Worksheet 8.3 (*Teacher Guide*, pages 111–112)			
	Day 63	Lesson 8.4 (*Student Textbook*, pages 153–155) Worksheet 8.4 (*Teacher Guide*, pages 113–114)			
	Day 64	Lesson 8.5 (*Student Textbook*, pages 156–157) Worksheet 8.5 (*Teacher Guide*, pages 115–116)			
	Day 65	Lesson 8.6 (*Student Textbook*, page 157) Study Day			

Suggested Daily Schedule

(to complete Book 2 in a school year)

Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 66	**Quiz 7** (*Teacher Guide*, page 321)			
	Day 67	Lesson 9.1 (*Student Textbook*, pages 159–162) Worksheet 9.1 (*Teacher Guide*, pages 117–118)			
	Day 68	Lesson 9.2 (*Student Textbook*, pages 162–167) Worksheet 9.2 (*Teacher Guide*, pages 119–120)			
	Day 69	Lesson 9.3 (*Student Textbook*, pages 167–169) Worksheet 9.3 (*Teacher Guide*, pages 121–122)			
	Day 70				
Week 6	Day 71	Lesson 9.4 (*Student Textbook*, pages 169–172) Worksheet 9.4 (*Teacher Guide*, pages 123–124)			
	Day 72	Lesson 9.5 (*Student Textbook*, pages 172–175) Worksheet 9.5 (*Teacher Guide*, pages 125–126)			
	Day 73	Lesson 9.6 (*Student Textbook*, page 176) Study Day			
	Day 74	**Quiz 8** (*Teacher Guide*, pages 323–324)			
	Day 75	Lesson 10.1 (*Student Textbook*, pages 177–179) Worksheet 10.1 (*Teacher Guide*, pages 127–128)			
Week 7	Day 76	Lesson 10.2 (*Student Textbook*, pages 179–180) Worksheet 10.2 (*Teacher Guide*, pages 129–130)			
	Day 77	Lesson 10.3 (*Student Textbook*, pages 180–182) Worksheet 10.3 (*Teacher Guide*, pages 131–132)			
	Day 78	Lesson 10.4 (*Student Textbook*, pages 182–186) Worksheet 10.4 (*Teacher Guide*, pages 133–134)			
	Day 79	Lesson 10.5 (*Student Textbook*, pages 186–189) Worksheet 10.5 (*Teacher Guide*, pages 135)			
	Day 80	**Quiz 9** (*Teacher Guide*, pages 325–326)			
Week 8	Day 81	Lesson 11.1 (*Student Textbook*, pages 189–194) Worksheet 11.1 (*Teacher Guide*, pages 137–138)			
	Day 82	Lesson 11.2 (*Student Textbook*, pages 194–199) Worksheet 11.2 (*Teacher Guide*, page 139–140)			
	Day 83	Lesson 11.3 (*Student Textbook*, pages 199–201) Worksheet 11.3 (*Teacher Guide*, pages 141–142)			
	Day 84	Lesson 11.4 (*Student Textbook*, pages 201–203) Worksheet 11.4 (*Teacher Guide*, pages 143–144)			
	Day 85	Lesson 11.5 (*Student Textbook*, pages 204–208) Worksheet 11.5 (*Teacher Guide*, pages 145–148)			
Week 9	Day 86	Lesson 11.6 (*Student Textbook*, pages 208–209) Study Day			
	Day 87	**Quiz 10** (*Teacher Guide*, page 327)*			
	Day 88	Worksheet 11.6 (*Teacher Guide*, pages 149–152)			
	Day 89	Study Day			
	Day 90	**Test 2** (*Teacher Guide*, pages 349–350)			
		Midterm Grade			

* Quiz 10 gives students the assignment to write a one to three paragraph analysis of a real-life use of statistics.

Suggested Daily Schedule

(to complete Book 2 in a school year)

Date	Day	Assignment	Due Date	✓	Grade
Second Semester—Third Quarter					
Week 1	Day 91	Lesson 12.1 (*Student Textbook*, pages 211–213) Worksheet 12.1* (*Teacher Guide*, pages 153–154)			
	Day 92	Lesson 12.2 (*Student Textbook*, pages 213–216) Worksheet 12.2 (*Teacher Guide*, pages 155–156)			
	Day 93	Lesson 12.3 (*Student Textbook*, pages 216–218) Worksheet 12.3 (*Teacher Guide*, pages 157–158)			
	Day 94	Lesson 12.4 (*Student Textbook*, pages 218–222) Worksheet 12.4 (*Teacher Guide*, pages 159–160)			
	Day 95	Lesson 12.5 (*Student Textbook*, pages 222–225) Worksheet 12.5 (*Teacher Guide*, pages 161–162)			
Week 2	Day 96	Lesson 12.6 (*Student Textbook*, pages 225–227) Worksheet 12.6 (*Teacher Guide*, pages 163–164)			
	Day 97	Lesson 12.7 (*Student Textbook*, pages 228–232) Worksheet 12.7 (*Teacher Guide*, pages 165–166)*			
	Day 98	Lesson 12.8 (*Student Textbook*, pages 233–234) Study Day			
	Day 99	**Quiz 11** (*Student Textbook*, pages 329–330)			
	Day 100	Lesson 13.1 (*Student Textbook*, pages 235–238) Worksheet 13.1 (*Teacher Guide*, pages 167–168)			
Week 3	Day 101	Lesson 13.2 (*Student Textbook*, pages 238–241) Worksheet 13.2 (*Teacher Guide*, pages 169–171)			
	Day 102	Lesson 13.3 (*Student Textbook*, pages 241–243) Worksheet 13.3 (*Teacher Guide*, pages 173–174)			
	Day 103	Lesson 13.4 (*Student Textbook*, pages 243–245) Worksheet 13.4 (*Teacher Guide*, pages 175–178)			
	Day 104	Lesson 13.5 (*Student Textbook*, pages 245–247) Worksheet 13.5 (*Teacher Guide*, pages 179–180)			
	Day 105	Lesson 13.6 (*Student Textbook*, page 247) Study Day			
Week 4	Day 106	**Quiz 12** (*Teacher Guide*, pages 331–332)			
	Day 107	Lesson 14.1 (*Student Textbook*, pages 249–254) Worksheet 14.1 (*Teacher Guide*, pages 181–183)			
	Day 108	Lesson 14.2 (*Student Textbook*, pages 254–257) Worksheet 14.2 (*Teacher Guide*, pages 185–186)			
	Day 109	Lesson 14.3 (*Student Textbook*, pages 258–260) Worksheet 14.3 (*Teacher Guide*, pages 187–190)			
	Day 110	Lesson 14.4 (*Student Textbook*, pages 260–265) Worksheet 14.4 (*Teacher Guide*, pages 191–192)			

* Worksheet 12.1 includes assignment to toss a coin and roll a die.

* Worksheet 12.7 includes assignment to read or watch one of the suggested videos on genetics and write a paragraph summary.

Suggested Daily Schedule

(to complete Book 2 in a school year)

Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 111	Lesson 14.5 (*Student Textbook*, pages 265–270) Worksheet 14.5 (*Teacher Guide*, pages 193–195)			
	Day 112	Lesson 14.6 (*Student Textbook*, pages 270–275) Worksheet 14.6 (*Teacher Guide*, pages 197–200)			
	Day 113	Lesson 14.7 (*Student Textbook*, pages 275–278) Worksheet 14.7 (*Teacher Guide*, pages 201–204)			
	Day 114	Lesson 14.8 (*Student Textbook*, pages 279–280) **Quiz 13** (*Teacher Guide*, pages 333–334)			
	Day 115				
Week 6	Day 116	Lesson 15.1 (*Student Textbook*, pages 281–285) Worksheet 15.1 (*Teacher Guide*, pages 205–206)			
	Day 117	Lesson 15.2 (*Student Textbook*, pages 285–287) Worksheet 15.2 (*Teacher Guide*, pages 207–208)			
	Day 118	Lesson 15.3 (*Student Textbook*, pages 287–291) Worksheet 15.3 (*Teacher Guide*, pages 209–210)			
	Day 119	Lesson 15.4 (*Student Textbook*, pages 291–292) Worksheet 15.4 (*Teacher Guide*, pages 211–212)			
	Day 120	Lesson 15.5 (*Student Textbook*, pages 292–295) Worksheet 15.5 (*Teacher Guide*, pages 213–214)			
Week 7	Day 121	Lesson 15.6 (*Student Textbook*, pages 296–298) Worksheet 15.6 (*Teacher Guide*, pages 215–216)			
	Day 122	Lesson 15.7 (*Student Textbook*, pages 298–301) Worksheet 15.7 (*Teacher Guide*, pages 217–218)*			
	Day 123	Lesson 15.8 (*Student Textbook*, pages 302–303) **Quiz 14** (*Teacher Guide*, pages 335–336)			
	Day 124	Lesson 16.1 (*Student Textbook*, pages 305–306) Worksheet 16.1 (*Teacher Guide*, pages 219–220)			
	Day 125	Lesson 16.2 (*Student Textbook*, pages 306–308) Worksheet 16.2A (*Teacher Guide*, pages 221–222)			
Week 8	Day 126	Worksheet 16.2B (*Teacher Guide*, pages 223–224)			
	Day 127	Lesson 16.3 (*Student Textbook*, pages 308–312) Worksheet 16.3A (*Teacher Guide*, page 225)			
	Day 128	Worksheet 16.3B (*Teacher Guide*, pages 227–228)			
	Day 129	Lesson 16.4 (*Student Textbook*, pages 313–314) Worksheet 16.4 (*Teacher Guide*, pages 229–230)			
	Day 130	Lesson 16.5 (*Student Textbook*, pages 314–316) Worksheet 16.5 (*Teacher Guide*, pages 231–232)			
Week 9	Day 131	Lesson 16.6 (*Student Textbook*, pages 316–319) Worksheet 16.6 (*Teacher Guide*, pages 233–234)			
	Day 132	Lesson 16.7 (*Student Textbook*, pages 319–320) **Quiz 15** (*Teacher Guide*, page 337)			
	Day 133	Worksheet 16.7 (*Teacher Guide*, pages 235–240)			
	Day 134	Study Day			
	Day 135	**Test 3** (*Teacher Guide*, pages 351–353)			

* Worksheet 15.7 includes assignment to watch suggested video or read suggested article on radiometric dating.

Suggested Daily Schedule

(to complete Book 2 in a school year)

Date	Day	Assignment	Due Date	✓	Grade
Second Semester—Fourth Quarter					
Week 1	Day 136	Lesson 17.1 (*Student Textbook*, pages 321–323) Worksheet 17.1 (*Teacher Guide*, page 241)			
	Day 137	Lesson 17.2 (*Student Textbook*, pages 323–325) Worksheet 17.2 (*Teacher Guide*, pages 243–244)			
	Day 138	Lesson 17.3 (*Student Textbook*, pages 325–327) Worksheet 17.3 (*Teacher Guide*, pages 245)			
	Day 139	Lesson 17.4 (*Student Textbook*, pages 327–328) Worksheet 17.4 (*Teacher Guide*, pages 247–248)*			
	Day 140				
Week 2	Day 141	Lesson 17.5 (*Student Textbook*, pages 328–332) Worksheet 17.5 (*Teacher Guide*, pages 249–250)			
	Day 142	Lesson 17.6 (*Student Textbook*, pages 333–334) Worksheet 17.6 (*Teacher Guide*, pages 251–252)			
	Day 143	Lesson 17.7 (*Student Textbook*, pages 334–336) Worksheet 17.7 (*Teacher Guide*, pages 253–254)			
	Day 144	Lesson 17.8 (*Student Textbook*, pages 336–339) Worksheet 17.8 (*Teacher Guide*, pages 255–256)			
	Day 145				
Week 3	Day 146	Lesson 17.9 (*Student Textbook*, pages 339–341) Study Day			
	Day 147	**Quiz 16** (*Teacher Guide*, pages 339–340)			
	Day 148	Lesson 18.1 (*Student Textbook*, pages 343–347) Worksheet 18.1 (*Teacher Guide*, pages 257–260)			
	Day 149	Lesson 18.2 (*Student Textbook*, pages 347–352) Worksheet 18.2 (*Teacher Guide*, pages 261–262)			
	Day 150				
Week 4	Day 151	Lesson 18.3 (*Student Textbook*, pages 352–354) Worksheet 18.3 (*Teacher Guide*, pages 263–265)			
	Day 152	Lesson 18.4 (*Student Textbook*, pages 354–357) Worksheet 18.4 (*Teacher Guide*, pages 267–268)			
	Day 153	Lesson 18.5 (*Student Textbook*, pages 357–363) Worksheet 18.5 (*Teacher Guide*, pages 269)			
	Day 154	**Quiz 17** (*Teacher Guide*, page 341)			
	Day 155	Lesson 19.1 (*Student Textbook*, pages 365–367) Worksheet 19.1 (*Teacher Guide*, pages 271–272)			

* Worksheet 17.4 includes assignment to research the history of a calculator.

Suggested Daily Schedule

(to complete Book 2 in a school year)

Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 156	Lesson 19.2 (*Student Textbook*, pages 367–369) Worksheet 19.2 (*Teacher Guide*, pages 273–274)			
	Day 157	Lesson 19.3 (*Student Textbook*, pages 369–371) Worksheet 19.3 (*Teacher Guide*, pages 275–276)*			
	Day 158	Lesson 19.4 (*Student Textbook*, pages 371–374) Worksheet 19.4 (*Teacher Guide*, pages 277–278)*			
	Day 159	Lesson 19.5 (*Student Textbook*, pages 374–375) Worksheet 19.5* (*Teacher Guide*, page 279)			
	Day 160	**Quiz 18** (*Teacher Guide*, page 343)			
Week 6	Day 161	Lesson 20.1 (*Student Textbook*, pages 377–380) Worksheet 20.1 (*Teacher Guide*, pages 281–282)			
	Day 162	Lesson 20.2 (*Student Textbook*, pages 380–383) Worksheet 20.2 (*Teacher Guide*, pages 283–284)			
	Day 163	Lesson 20.3 (*Student Textbook*, pages 383–385) Worksheet 20.3 (*Teacher Guide*, pages 285–286)			
	Day 164	Lesson 20.4 (*Student Textbook*, pages 385–388) Worksheet 20.4 (*Teacher Guide*, pages 287–288)			
	Day 165				
Week 7	Day 166	Lesson 20.5 (*Student Textbook*, page 388) Study Day			
	Day 167	**Quiz 19** (*Teacher Guide*, page 345)			
	Day 168	Worksheet 20.5 (*Teacher Guide*, pages 289–292)			
	Day 169	Study Day			
	Day 170	**Test 4** (*Teacher Guide*, pages 355–356)			
Week 8	Day 171	Lesson 21.1 (*Student Textbook*, pages 389–390) Worksheet 21.1 (*Teacher Guide*, pages 293–294)* (Project Assigned)			
	Day 172	Lesson 21.2 (*Student Textbook*, pages 390–391) Worksheet 21.2 (*Teacher Guide*, pages 295–296)			
	Day 173	Lesson 21.3 (*Student Textbook*, pages 391–392) Worksheet 21.3A (*Teacher Guide*, pages 297–298)			
	Day 174	Work on Project			
	Day 175	Worksheet 21.3B (*Teacher Guide*, pages 299–300)			
Week 9	Day 176	Work on Project			
	Day 177	Worksheet 21.3C (*Teacher Guide*, pages 301–302)			
	Day 178	Study Day			
	Day 179	Study Day			
	Day 180	**Test 5** (Final) (*Teacher Guide*, pages 357–360) Project Due			
		Final Grade			

* Worksheet 19.3 includes optional assignment to play notes on a piano.
* Worksheet 19.5 includes assignment involving an Internet search.
* End-of-the-year project includes hands-on assignment to either put together a budget for a vacation or explore different savings accounts.

Suggested Accelerated Daily Schedule

(to complete Book 2 in a semester)

This schedule assumes students finished the material covered in Book 1 in the previous semester. Many lessons in the first two chapters that review those foundational concepts have been skipped. If your student has not recently finished Book 1, you will need to have them read the entire first two chapters before beginning, as an understanding of the concepts covered there is crucial.

On days students are completing multiple worksheets, you may wish to assign students only some of each type of problem (especially if the problems are mainly review), assigning additional problems only if the student gets problems incorrect.

Date	Day	Assignment	Due Date	✓	Grade
First Semester—First Quarter					
Week 1	Day 1	Lessons 1.1, 2.1, 2.4 (*Student Textbook*, pages 13–18, 33–35, 41–46) Worksheets 1.1, 2.1, 2.4 (*Teacher Guide*, pages 21–22, 31, 37–38)			
	Day 2	Lessons 2.5–2.7 (*Student Textbook*, pages 46–58) Worksheets 2.5–2.6 (*Teacher Guide*, pages 39–42)			
	Day 3	**Quiz 1** (*Teacher Guide*, pages 309–310) Study Day*			
	Day 4	Lessons 3.1–3.2 (*Student Textbook*, pages 59–64) Worksheets 3.1–3.2 (*Teacher Guide*, pages 43–46)			
	Day 5	Lessons 3.3–3.4 (*Student Textbook*, pages 64–70) Worksheets 3.3–3.4 (*Teacher Guide*, pages 47–50)			
Week 2	Day 6	Lessons 3.5–3.6 (*Student Textbook*, pages 70–75) Worksheets 3.5–3.6 (*Teacher Guide*, pages 51–54)			
	Day 7	Lessons 3.7–3.8 (*Student Textbook*, pages 75–80) Worksheet 3.7 (*Teacher Guide*, pages 55–56) **Quiz 2** (*Teacher Guide*, pages 311–312)			
	Day 8	Lessons 4.1–4.2 (*Student Textbook*, pages 81–86) Worksheets 4.1–4.2 (*Teacher Guide*, pages 57–60)			
	Day 9	Lesson 4.3 (*Student Textbook*, pages 86–88) Worksheet 4.3 (*Teacher Guide*, pages 61–62)			
	Day 10	Lesson 4.4 (*Student Textbook*, pages 89–90) Worksheet 4.4 (*Teacher Guide*, pages 63–64)			

* Use this study day to spend extra time reviewing any concepts covered in the first two chapters that need more review. The first two chapters reviewed many foundational concepts; it's important to be comfortable with them before continuing.

Suggested Accelerated Daily Schedule

(to complete Book 2 in a semester)

Date	Day	Assignment	Due Date	✓	Grade
Week 3	Day 11	Lessons 4.5–4.6 (*Student Textbook*, pages 91–94) Worksheet 4.5 (*Teacher Guide*, pages 65–66) **Quiz 3** (*Teacher Guide*, pages 313–314)			
	Day 12	Lesson 5.1 (*Student Textbook*, pages 95–101) Worksheets 5.1A–5.1B (*Teacher Guide*, pages 67–70)			
	Day 13	Lesson 5.2 (*Student Textbook*, pages 101–105) Worksheet 5.2 (*Teacher Guide*, pages 71–72)*			
	Day 14	Lesson 5.3 (*Student Textbook*, pages 106–108) Worksheets 5.3A–5.3B (*Teacher Guide*, pages 73–76)			
	Day 15	Lessons 5.4–5.5 (*Student Textbook*, pages 108–115) Worksheets 5.4–5.5 (*Teacher Guide*, pages 77–80)			
Week 4	Day 16	Lesson 5.6 (*Student Textbook*, pages 115–116) **Quiz 4** (*Teacher Guide*, pages 315–316)			
	Day 17	Worksheet 5.6 (*Student Textbook*, page 81–84) Study Day			
	Day 18	**Test 1** (*Teacher Guide*, pages 347–348)			
	Day 19	Lessons 6.1–6.2 (*Student Textbook*, page 117–124) Worksheets 6.1–6.2B (*Teacher Guide*, pages 85–90)			
	Day 20	Lesson 6.3 (*Student Textbook*, pages 124–128) Worksheet 6.3A (*Teacher Guide*, pages 91–92)			
Week 5	Day 21	Lesson 6.4 (*Student Textbook*, pages 128–130) Worksheets 6.3B–6.4 (*Teacher Guide*, pages 93–96)			
	Day 22	Lesson 6.5 (*Student Textbook*, pages 130–132) **Quiz 5** (*Teacher Guide*, pages 317–318)			
	Day 23	Lesson 7.1 (*Student Textbook*, pages 133–136) Worksheet 7.1 (*Teacher Guide*, pages 97–98)			
	Day 24	Lessons 7.2–7.3 (*Student Textbook*, pages 136–141) Worksheets 7.2–7.3 (*Teacher Guide*, pages 99–102)			
	Day 25	Lessons 7.4–7.5 (*Student Textbook*, pages 141–145) Worksheets 7.4–7.5 (*Teacher Guide*, pages 103–106)			
Week 6	Day 26	**Quiz 6** (*Teacher Guide*, page 319) Lessons 8.1–8.2 (*Student Textbook*, pages 147–150) Worksheets 8.1–8.2 (*Teacher Guide*, pages 107–110)			
	Day 27	Lesson 8.3 (*Student Textbook*, pages 151–153) Worksheet 8.3 (*Teacher Guide*, pages 111–112)			
	Day 28	Lessons 8.4–8.5 (*Student Textbook*, pages 153–157) Worksheets 8.4–8.5 (*Teacher Guide*, pages 113–116)			
	Day 29	Lesson 8.6 (*Student Textbook*, page 157) **Quiz 7** (*Teacher Guide*, page 321)			
	Day 30	Lessons 9.1–9.2 (*Student Textbook*, pages 159–167) Worksheets 9.1–9.2 (*Teacher Guide*, pages 117–120)			

Suggested Accelerated Daily Schedule

(to complete Book 2 in a semester)

Date	Day	Assignment	Due Date	✓	Grade
Week 7	Day 31	Lessons 9.3–9.4 (*Student Textbook*, pages 167–172) Worksheets 9.3–9.4 (*Teacher Guide*, pages 121–124)			
	Day 32	Lessons 9.5–9.6 (*Student Textbook*, pages 172–176) Worksheet 9.5 (*Teacher Guide*, pages 125–126) **Quiz 8** (*Teacher Guide*, pages 323–324)			
	Day 33	Lessons 10.1–10.2 (*Student Textbook*, pages 177–180) Worksheets 10.1–10.2 (*Teacher Guide*, pages 127–130)			
	Day 34	Lessons 10.3–10.4 (*Student Textbook*, pages 180–186) Worksheets 10.3–10.4 (*Teacher Guide*, pages 131–134)			
	Day 35	**Quiz 9** (*Teacher Guide*, pages 325–326) Lessons 10.5–11.1 (*Student Textbook*, pages 186–194) Worksheets 10.5 (optional)–11.1 (*Teacher Guide*, pages 135–138)			
Week 8	Day 36	Lessons 11.2–11.3 (*Student Textbook*, pages 194–201) Worksheets 11.2–11.3 (*Teacher Guide*, pages 139–142)			
	Day 37	Lessons 11.4–11.5 (*Student Textbook*, pages 201–208) Worksheets 11.4–11.5 (*Teacher Guide*, pages 143–148)			
	Day 38	Lesson 11.6 (*Student Textbook*, pages 208–209) **Quiz 10** (*Teacher Guide*, page 327)*			
	Day 39	Worksheet 11.6 (*Teacher Guide*, pages 149–152) Study Day			
	Day 40	**Test 2** (*Teacher Guide*, pages 349–350)			
Week 9	Day 41	Lessons 12.1–12.2 (*Student Textbook*, pages 211–216) Worksheets 12.1–12.2 (*Teacher Guide*, pages 153–156)*			
	Day 42	Lessons 12.3–12.4 (*Student Textbook*, pages 216–222) Worksheets 12.3–12.4 (*Teacher Guide*, pages 157–160)			
	Day 43	Lesson 12.5 (*Student Textbook*, pages 222–225) Worksheet 12.5 (*Teacher Guide*, pages 161–162)			
	Day 44	Lesson 12.6 (*Student Textbook*, pages 225–227) Worksheet 12.6 (*Teacher Guide*, pages 163–164)			
	Day 45	Lessons 12.7–12.8 (*Student Textbook*, pages 228–234) Worksheet 12.7 (*Teacher Guide*, pages 165–166)* **Quiz 11** (*Teacher Guide*, pages 329–330)			
First Semester—Second Quarter					
Week 1	Day 46	Lesson 13.1 (*Student Textbook*, pages 235–238) Worksheet 13.1 (*Teacher Guide*, pages 167–168)			
	Day 47	Lessons 13.2–13.3 (*Student Textbook*, pages 238–243) Worksheets 13.2–13.3 (*Teacher Guide*, pages 169–174)			
	Day 48	Lesson 13.4 (*Student Textbook*, pages 243–245) Worksheet 13.4 (*Teacher Guide*, pages 175–178)			
	Day 49	Lessons 13.5–13.6 (*Student Textbook*, pages 245–247) Worksheet 13.5 (*Teacher Guide*, pages 179–180) **Quiz 12** (*Teacher Guide*, pages 331–332)			
	Day 50	Lessons 14.1–14.2 (*Student Textbook*, pages 249–257) Worksheets 14.1–14.2 (*Teacher Guide*, pages 181–186)			

* Quiz 10 gives students the assignment to write a one to three paragraph analysis of a real-life use of statistics.

* Worksheet 12.1 includes assignment to toss a coin and roll a die.

* Worksheet 12.7 includes assignment to read or watch one of the suggested videos on genetics and write a paragraph summary.

Suggested Accelerated Daily Schedule

(to complete Book 2 in a semester)

Date	Day	Assignment	Due Date	✓	Grade
Week 2	Day 51	Lessons 14.3–14.4 (*Student Textbook*, pages 258–265) Worksheets 14.3–14.4 (*Teacher Guide*, pages 187–192)			
	Day 52	Lesson 14.5 (*Student Textbook*, pages 265–270) Worksheet 14.5 (*Teacher Guide*, pages 193–195)			
	Day 53	Lesson 14.6 (*Student Textbook*, pages 270–275) Worksheet 14.6 (*Teacher Guide*, pages 197–200)			
	Day 54	Lessons 14.7–14.8 (*Student Textbook*, pages 275–280) Worksheet 14.7 (*Teacher Guide*, pages 201–204) **Quiz 13** (*Teacher Guide*, pages 333–334)			
	Day 55	Lessons 15.1–15.2 (*Student Textbook*, pages 281–287) Worksheets 15.1–15.2 (*Teacher Guide*, pages 205–208)			
Week 3	Day 56	Lessons 15.3–15.4 (*Student Textbook*, pages 287–292) Worksheets 15.3–15.4 (*Teacher Guide*, pages 209–212)			
	Day 57	Lessons 15.5–15.6 (*Student Textbook*, pages 292–298) Worksheets 15.5–15.6 (*Teacher Guide*, pages 213–216)			
	Day 58	Lessons 15.7–15.8 (*Student Textbook*, pages 298–303) Worksheet 15.7 (*Teacher Guide*, pages 217–218)*			
	Day 59	**Quiz 14** (*Teacher Guide*, pages 335–336); Lesson 16.1 (*Student Textbook*, pages 305–306) Worksheet 16.1 (*Teacher Guide*, pages 219–220)			
	Day 60	Lesson 16.2 (*Student Textbook*, pages 306–308) Worksheets 16.2A– 16.2B (*Teacher Guide*, pages 221–224)			
Week 4	Day 61	Lesson 16.3 (*Student Textbook*, pages 308–312) Worksheets 16.3A–16.3B (*Teacher Guide*, pages 225–228)			
	Day 62	Lessons 16.4–16.5 (*Student Textbook*, pages 313–316) Worksheets 16.4–16.5 (*Teacher Guide*, pages 229–332)			
	Day 63	Lessons 16.6–16.7 (*Student Textbook*, pages 316–320) Worksheet 16.6 (*Teacher Guide*, pages 233–234)			
	Day 64	**Quiz 15** (*Teacher Guide*, page 337) Worksheet 16.7 (*Teacher Guide*, pages 235–240)			
	Day 65	**Test 3** (*Teacher Guide*, pages 351–353)			
Week 5	Day 66	Lessons 17.1–17.2 (*Student Textbook*, pages 321–325) Worksheets 17.1–17.2 (*Teacher Guide*, pages 241–244)			
	Day 67	Lessons 17.3–17.4 (*Student Textbook*, pages 325–328) Worksheets 17.3–17.4 (*Teacher Guide*, pages 245–248)*			
	Day 68	Lesson 17.5 (*Student Textbook*, pages 328–332) Worksheet 17.5 (*Teacher Guide*, pages 249–250)			
	Day 69	Lesson 17.6 (*Student Textbook*, pages 333–334) Worksheet 17.6 (*Teacher Guide*, pages 251–252)			
	Day 70	Lesson 17.7 (*Student Textbook*, pages 334–336) Worksheet 17.7 (*Teacher Guide*, pages 253–254)			

* Worksheet 15.7 includes assignment to watch suggested video or read suggested article on radiometric dating.

* Worksheet 17.4 includes assignment to research the history of a calculator.

Suggested Accelerated Daily Schedule

(to complete Book 2 in a semester)

Date	Day	Assignment	Due Date	✓	Grade
Week 6	Day 71	Lesson 17.8 (*Student Textbook*, pages 336–339) Worksheet 17.8 (*Teacher Guide*, pages 255–256)			
	Day 72	Lesson 17.9 (*Student Textbook*, pages 339–341) **Quiz 16** (*Teacher Guide*, pages 339–340)			
	Day 73	Lesson 18.1 (*Student Textbook*, page 343–347) Worksheet 18.1 (*Teacher Guide*, pages 257–260)			
	Day 74	Lesson 18.2 (*Student Textbook*, pages 347–352) Worksheet 18.2 (*Teacher Guide*, pages 261–262)			
	Day 75	Lesson 18.3 (*Student Textbook*, pages 352–354) Worksheet 18.3 (*Teacher Guide*, pages 263–265)			
Week 7	Day 76	Lessons 18.4–18.5 (*Student Textbook*, pages 354–363) Worksheets 18.4–18.5 (*Teacher Guide*, pages 267–269)			
	Day 77	**Quiz 17** (*Teacher Guide*, page 341) Lesson 19.1 (*Student Textbook*, pages 365–367) Worksheet 19.1 (*Teacher Guide*, pages 271–272)			
	Day 78	Lesson 19.2 (*Student Textbook*, pages 367–369) Worksheet 19.2 (*Teacher Guide*, pages 273-274)			
	Day 79	Lessons 19.3–19.5 (*Student Textbook*, pages 369–375) Worksheets 19.3–19.5 (*Teacher Guide*, pages 275–279)*			
	Day 80	**Quiz 18** (*Teacher Guide*, page 343) Lesson 20.1 (*Student Textbook*, pages 377–380) Worksheet 20.1 (*Teacher Guide*, pages 281–282)			
Week 8	Day 81	Lesson 20.2 (*Student Textbook*, pages 380–383) Worksheet 20.2 (*Teacher Guide*, pages 283–284)			
	Day 82	Lesson 20.3 (*Student Textbook*, pages 383–385) Worksheet 20.3 (*Teacher Guide*, pages 285–286)			
	Day 83	Lessons 20.4–20.5 (*Student Textbook*, pages 385–388) Worksheet 20.4 (*Teacher Guide*, pages 287–288) **Quiz 19** (*Teacher Guide*, page 345)			
	Day 84	Worksheet 20.5 (*Teacher Guide*, pages 289–292)			
	Day 85	**Test 4** (*Teacher Guide*, pages 355–356)			
Week 9	Day 86	Lesson 21.1 (*Student Textbook*, pages 389–390) Worksheet 21.1 (*Teacher Guide*, page 293–294)* (Project Assigned)			
	Day 87	Lesson 21.2 (*Student Textbook*, pages 390–391) Worksheet 21.2 (*Teacher Guide*, pages 295–296) Work on Project			
	Day 88	Lesson 21.3 (*Student Textbook*, pages 391–392) Worksheet 21.3A (*Teacher Guide*, pages 297–298) Work on Project			
	Day 89	Worksheets 21.3B–21.3C (*Teacher Guide*, pages 299–302) Work on Project			
	Day 90	**Test 5** (Final) (*Teacher Guide*, pages 357–360) Project Due			
		Final Grade			

* Worksheet 19.3 includes optional assignment to play notes on a piano.
* Worksheet 19.5 includes assignment involving an Internet search.
* End-of-the-year project includes hands-on assignment to either put together a budget for a vacation or explore different savings accounts.

Principles of Mathematics 2
Worksheets

1. **Notebook and Flashcard Preparation —** Place a copy of the reference sheets from the back of this *Teacher Guide* (pages 423–432) inside a three-ring binder. Use this "notebook" to **take additional notes as you study** (make sure you have some extra lined paper inside), as well as to store your completed worksheets. Keeping a notebook of key information as you go can help you remember the information and find it easily when needed. You may also find it helpful to use index cards to make flashcards of new terms or concepts, so make sure you have some blank index cards in the front of your binder that you can use.

2. **Flashcard and Notebook Use —** Now that your notebook is prepped, add the definitions for *expression*, *equation*, and *simplify* to it. You may also wish to make flashcards for the terms using index cards. We will not include a reminder about writing in your notebook or making flashcards; however, you'll save yourself a lot of frustration if you use the notebook, flashcards, or whatever other method works for you to keep track of terms and concepts.

3. **Math in Action —** Name 10 ways math applies outside of a textbook.

   a.

   b.

   c.

   d .

   e .

   f.

   g .

   h.

   i.

   j.

4. **Worldview Thinking**

   a. What is a worldview?

   b. Summarize what math is and why it works.

   c. As we use math, why do we find both evidence of God's wisdom and care and evidence of suffering and death?

5. **Term Time**

   a. Is 5 + 9 an expression or an equation?

   b. Simplify 5 + 9

6. **General Instructions —** Be sure to read the "General Instructions for Students" section (p. 421–422).

   a. When are you allowed to use a calculator in this course?

   b. Round 0.5432 the way it should be rounded if it's the answer to a problem.

   c. Round 0.8975 the way it should be rounded if it's the answer to a problem.

   d. Should you round 0.8975 if it's a number you need to input into your calculator in order to solve a problem?

   e. When should you include a unit of measure in your answer?

   f. List one suggestion given for how to study on study days.

These next few worksheets include a lot of practice performing operations with both whole and decimal numbers. Hopefully, these operations are all quite familiar to you — if not, stop and review the appropriate sections of Book 1.

1. Questions

a. We use symbols to _____ quantities, _____, and _____.

b. Write down the mathematical symbols for minus, plus, equals, and does not equal.

c. Represent the multiplication of "20 times 6" three different ways.

d. What is a convention?

2. Place Value

Example: What does the 4 in 0.4 represent? *Answer*: 4 tenths *or* $\frac{4}{10}$

a. What does the 8 in 83 represent?

b. What does the 8 in 0.08 represent?

3. Representing Multiplication — Rewrite each multiplication using parentheses and simplify.

Example: 4 x 5 = 4(5) = 20

a. 5 x 6

Example Meaning: 5 tickets at $6 each

b. 2 x 105

Example Meaning: 2 tickets at $105 each

4. Representing Multiplication — Rewrite each multiplication using a • and simplify.

Example: 4 x 5 = 4 • 5 = 20

a. 8 x 9

b. 7 x 218

5. The Order of Operations — Simplify.

a. $8 - 3 + 2$

b. $(8 - 2)10 \div 2$

c. $7.5(0.23 + 0.96) - 1.8$

d. $4\overline{)4 + 9 + 7}$

e. $2.5 + 4.1(5.6 - 3) \div 2$

6. Term Review

a. Is $8.5 \div 2$ an expression or an equation?

b. Simplify: $8.5 \div 2$

1. Reviewing Properties

a. Insert either = or ≠ in between these expressions:

5 + 2 + 6 5 + 2 + 5

b. Insert either = or ≠ in between these expressions:

(17 + 5) + 2 17 + (5 + 2)

c. What property describes the fact that the expressions in 1b were/were not equal?

d. Insert either = or ≠ in between these expressions:

15 ÷ 5 ÷ 1 5 ÷ 15 ÷ 1

e. Insert either = or ≠ in between these expressions:

2 • 1 2

f. What is the property that describes the fact that multiplying by 1 doesn't change the value of a number?

g. Insert either = or ≠ in between these expressions:

2 + 0 2

h. What is the property that describes the fact that adding 0 doesn't change the value of a number?

i. Insert either = or ≠ in between these expressions:

36 ÷ 36 1

j. Insert either = or ≠ in between these expressions:

36 ÷ 1 36

2. Reviewing the Distributive Property — Simplify using the distributive property; show your work.

a. 9(15 + 22)

Example Meaning: If one package contains 15 plates and another 22, and I decide to buy 9 of each package, how many plates will I get altogether?

b. 5($8.45 + $3.99)

Example Meaning: If it costs $8.45 for admission and $3.99 for food per person, what is the total cost for 5 people?

3. Operations Review

a. Simplify: 80 + 93 + 83

Example Meaning: Your scores on three tests so far are 80, 93, and 83. What is the total of all three scores?

b. Divide the sum from problem 3a by 3.

Example Meaning: What is the average score of all three tests?

c. Simplify: $23.15 – $11.79

Example Meaning: You spend $23.15 and then return $11.79. How much did you spend after the return?

d. Simplify: 42($69.49)

Example Meaning: If it costs $69.49 to attend a conference and 42 people attend, how much did the conference receive in admission fees?

As we study math, we see evidence everywhere of God's faithfulness in holding the universe together. Take a moment to praise God for being the faithful Creator and Sustainer of all.

You may use a calculator on this worksheet whenever you see this symbol ( ).

You don't have to write out every step in the word problems, but be sure to use the general process of defining, planning, solving, and checking. Always write out enough of your work that someone can see how you arrived at your answer.

1. **Bonuses ( ) —** Suppose you're trying to give gifts to the employees of your small business. One gift option (Option A) costs $32.50 an employee, while another (Option B) costs $5.50 + $25.30 per employee, plus a $50 initial charge. Which option is less expensive for 50 employees, and by how much less per employee is it?

2. **Cell Phone Plan ( ) —** Suppose you're trying to choose a cell phone plan. One plan (Plan A) offers you unlimited minutes for $76.45 a month for two phones, plus $19.99 a month for each additional phone. Another plan (Plan B) charges $23.45 a month for each phone, plus $35.40 per phone for service. If the phones themselves are free in both plans, what is the difference in total monthly cost if you need 4 phones?

3. **Cow Profits ( ) —** If a cow eats pasture worth $6 per year, 3.5 tons of hay worth $6.50 per ton, and 1,200 pounds of chopped feed worth $0.75 per 100 pounds, gives birth to a calf worth $6, gives 3 quarts of milk per day for 280 days in the year which is worth $0.05 a quart, and produces manure annually worth $12, how much money per year does the farm make off the cow after you deduct the expenses from the income? *Note*: As you might have guessed from the prices, this problem was adapted from an early 1900s book.

4. Skill Sharpening — Simplify.

a. $8 + (82 \bullet 2)5 + 5$

b. $88 \bullet 1 + 0$

c. $8 + 5 - 3 + 2$

Reminder: Consult the reference sheets in the back to help answer geometry questions as needed.

1. Name That Shape — What two-dimensional shape best describes these pictures? Choose the most descriptive name you can.

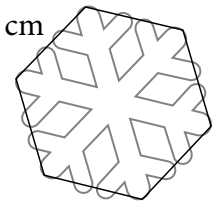




a. _____ b. _____ c. _____ d. _____ e. _____

2. Reviewing Measuring Shapes

a. If the outline of the snowflake shown has sides that are 0.5 cm, what is its perimeter?



b. What is the area of a square garden with 8-ft sides?

c. What is the volume of a rectangular fish tank (a rectangular prism) that's 36 in long, 13 in wide, and 24 in tall?

d. What is the area of a rectangle with a length of 9.5 in and a width of 3.3 in?

3. Term Time

a. What is an exponent?

b. Rewrite 8^2 as a multiplication.

c. Rewrite ft^2 as a multiplication.

4. Formulas

a. What is a formula?

b. Given that the power equals the voltage times the current ($P = V \bullet I$), what is the power (P) coming from an outlet with a voltage (V) of 120 volts and a current (I) of 25 amps? List your answer in a unit called watts (which is the result of multiplying volts by amps).

c. In the formula for finding the area of a rectangle ($A = \ell \bullet w$), what does the ℓ stand for?

d. If one month you made $62.54 in addition to your $587.89 monthly salary, how much did you make that month?

e. If you started with $56.15 and ended with $19.29, what is the difference between your starting and ending dollars?

5. Understanding Check — What does geometry mean?

You may use a calculator on this worksheet whenever you see this symbol ( ).

1. **Converting to Celsius ( ) —** Use the formula $C = \frac{5}{9}(F - 32°)$ to convert these Fahrenheit temperatures (F) to degrees Celsius (C). Use decimals rather than fractions to represent partial quantities in your answers.

   a. 80° F

   b. 20° F

   c. 32° F

2. **Nested Parentheses —** Simplify.

   a. $2[3(4 + 5)]$

   Example Meaning: It costs $4 for shoe rentals plus $5 to bowl. If 3 kids in a family go bowling 2 times, how much will it cost?

   b. $6[4 + 3(5 – 2)]$

   Example Meaning: It costs $5 a game, minus a $2 discount, plus a $4 fee per day. If each of 6 people plays 3 games, how much does it cost altogether?

3. **Applying Parentheses —** Show how you could write out these problems concisely using parentheses.

   Example: If you put together 40 party favors that each cost $4 plus $1.50, how much will it cost you to make all 40?
   Answer: 40($4 + $1.50)

   a. If it costs $4.50 plus $5 to crochet a baby blanket, how much will 9 blankets cost?

   b. If you buy items that cost $7 and $9.24, and are charged a 4% tax on your purchase, how much will you pay in tax?

4. Solving Parentheses — Solve each of the problems you wrote out in problem 3.

a.

b.

5. Skill Sharpening

a. If 3 of an item minus 1 of the same item equal $15, how much does the item cost?

b. If to fix a leak, the plumber says that he'll charge you 4 man hours (i.e., 4 times his hourly rate), and that to install a faucet while he's there will be 2 more man hours (i.e., 2 times his hourly rate), making the labor $480 altogether, how much is the plumber's hourly rate?

c. Solve: $3x - \frac{2}{8}x = 4$

d. Solve: $75.2 - y = 108$

You may use a calculator on this worksheet whenever you see this symbol ( ).

1. **Reviewing the Order of Operations —** Solve each problem using the order of operations.

   a. $4(5 + 10)$

   Example Meaning: If per person it costs $5 for food and $10 for admission, how much will it cost for 4 people?

   b. $\frac{5}{9}(\frac{6}{5} + \frac{3}{20})$

   c. $2(6 - 8)$

   d. $4(6 - 4)$

2. **Reviewing the Distributive Property —** Resolve problems 1a–1d using the distributive property. Show your work.

   a.

   b.

   c.

   d.

3. **Using the Distributive Property to Find Unknowns —** Use the distributive property to find these unknowns.

   a. $5(x + 2) = 30$

   b. $4(3 + x + 3) = 48$ *Hint*: You'll save time if you simplify inside the parentheses before you distribute. In this case, add the 3 + 3, simplifying the parentheses to $(6 + x)$.

   c. $4(x - 2) = 28$

d. $15(\$12 - x) = \$120$

Example Meaning: If 15 people can attend a concert for $120, and it costs $12 per person minus an unknown discount amount, how much is the discount?

e. $4(\frac{3}{4} + x) = 11$

f. $(5 + 2 + x)3 = 30$

Example Meaning: A necklace has 30 beads. The beads on the necklace follow a pattern that uses 5 black beads, 2 red beads, and some silver beads. If the pattern repeats itself exactly 3 times in the necklace, how many silver beads are used in the pattern?

4. Using Parentheses with Word Problems — Write these problems using parentheses. Solve. *Hint*: Some problems involve an unknown; others do not.

a. If it costs $1.50 for the stain plus $4.50 for the wood to make each wooden box, and if these are the only supplies needed, how much will 10 wooden boxes cost?

b. If to build 10 wooden boxes it costs a total of $50, and each one costs $2 for the wood plus whatever the cost of the stain is, how much does the stain cost per wooden box?

c. Suppose you go into business cutting trees. You pay your brother $7 an hour for his help and rent a chainsaw for $10 an hour. If you paid your brother and rented the chainsaw for 5 hours, how much did you spend?

d. Suppose once again you paid your brother $7 an hour for his help and to rent a chainsaw by the hour. If you paid your brother and rented the chainsaw for 5 hours, how much did you spend per hour on a chainsaw if you spent $75 total? *Hint*: This time, set up your problem with x representing the hourly cost of the chainsaw.

5. Converting to Fahrenheit (🖩) — Use the formula $C = \frac{5}{9}(F - 32°)$ to convert these temperatures to degrees Fahrenheit.

a. 15° Celsius

b. 100° Celsius

1. Parentheses Preceded by a Positive Sign — Solve these problems by multiplying the parentheses by 1 and distributing. Notice that in each case, you'd obtain the same answer as you would if you simply removed the parentheses.

Example: $2 + (3 + 4) =$
$2 + 1(3 + 4) =$
$2 + 1(3) + 1(4) =$
$2 + 3 + 4 = 9$

a. $4 + (5 + 6)$

Example Meaning: If you collected 4 bottles for charity, and a friend collected 5 bottles plus 6 bottles, how many bottles did the two of you collect altogether?

b. $20 + (43 - 5)$

Example Meaning: If you started with $20, earned $43 babysitting but spent $5 of that, how much money do you have now?

2. Parentheses Preceded by a Positive Sign with Unknowns — Solve.

a. $8 + (3 + x) = 30$

Example Meaning: If you collected 8 bottles for charity and a friend collected 3 bottles, plus some additional bottles (he couldn't remember how many), how many additional bottles did your friend collect if you and your friend combined collected a total of 30 bottles?

b. $\$15 + (\$35 - x) = \$25$

Example Meaning: Say you started with $15. You then earned $35 babysitting, but spent some of that on dinner. If you ended with $25, how much did you spend on dinner?

c. In the example meaning in problem 2b, what does the x represent?

3. **Checking Your Work —** Substitute the values you found for x in 2a and 2b back into the original equation to show that you obtained the correct values.

a. b.

4. Skill Sharpening

a. Solve: $2.5x = x + 39$

Example Meaning: If 2.5 times an expense equals the expense plus $39, how much is the expense?

b. Use parentheses to write this problem:

Each of 4 sisters was given 3 books. Each sister gave 1 of the 3 books away. How many books did the sisters keep altogether?

c. Solve 4b.

d. Use parentheses to write this problem. Note that there is an unknown this time.

Each of 4 brothers was given the same number of baseball cards. Each brother gave one baseball card away. Altogether, the brothers kept 60 baseball cards. How many baseball cards was each brother given?

e. Solve 4d.

You may use a calculator on this worksheet whenever you see this symbol ( ).

1. Earnings ( ) — The steps below will help you walk through this math problem:

Suppose the total of two boys' earnings is $1,200 a month, but the first boy earns $150 a month more than the second boy. How much does the second boy earn?

a. Use words to finish expressing the relationship between the total of $1,200 and each boy's earnings.

$1,200 = *first boy's earnings* + _____

b. Now let's express each boys earnings using symbols. Below, we've used x to represent the second boy's earnings. The first boy's earnings equal x plus what amount?

first boy's earnings = x + _____

second boy's earnings = x

c. Finish rewriting the relationship between total of $1,200 and each boy's earnings using only numbers and the unknown x. Use your answers to 1a and 1b to help you.

$1,200 = (_____ + _____) + _____

d. Solve the equation you wrote in 1c to find x (the second boy's earnings).

e. Check your work by substituting the value you found for x in 1d back into the equation you found in 1c.

f. What were the *first* boy's earnings?

2. Skill Sharpening ( )

a. Solve: $6(x + 3) = 25$

b. Solve: $2(x - 2) = 20$

c. Solve: $5(x + 2) = 15x$

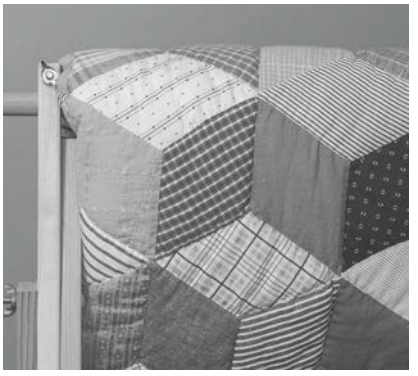
d. Solve: $\frac{3}{4}(5 - x) = 3$

Example Meaning: A recipe calls for 5 c of flour, but you always use less flour. If when you make $\frac{3}{4}$ of a batch you use a total of 3 c of flour, how much less flour do you use when you make a full batch?

e. Solve: $1.06(\$3.50 + \$5.50 - x) = \$5.13$

Example Meaning: Two items cost $3.50 and $5.50, minus a discount. If 6% sales tax was charged on that subtotal and if the total with the tax came to $5.13, how much was the discount?

f. Suppose you are making a quilt rack. You want to double (i.e., multiply by 2) all the dimensions to make it larger. One side in the rack is 24 inches plus 2 inches. Use parentheses to show that you want to double the sum of 24 inches and 2 inches.



g. Solve the problem in 4f

h. Simplify: $5[(1.5 + 6)5]$

i. Solve: $4x + 8 = 2x$

j. One week's paycheck includes two weeks' salary ($2x$) plus a bonus that's 10% of one week's salary ($0.1x$). The paycheck is for $800; how much is one week's salary?

1. Order of Operations — Solve each problem using the order of operations.

a. $-3(5 + 7 + 2)$

Example Meaning: It costs \$5 for admission, \$7 for dinner, and \$2 for dessert at an event. Three people paid, but were unable to attend. How much will the organizers of the event owe in refunds to the 3 people who paid and couldn't come, assuming they refund the full amount?

b. $3 - (9 - 2)$

Example Meaning: If you have \$3 in your wallet, but want to buy an item that costs \$9 minus a \$2 coupon, how much will you have left, assuming there's no tax on the item? (In this case, the negative answer indicates you don't have enough money to buy the item — it tells you how much money you're short.)

c. $37 - (10 - 4)$

Example Meaning: If you spend \$37 at the store, and then return an item that cost \$10 before a discount of \$4, how much did you spend after the return?

2. Distributing — Go back and resolve problems 1a–1c, using the distributive property. Show your work.

Example: $3 - (2 - 4) =$
$3 + -1(2 + -4) =$
$3 + -1(2) + -1(-4) =$
$3 + -2 + 4 = 5$

a.

b.

c.

3. Finding Unknowns — Solve.

a. $-4(\$2 + x) = -\$28$

b. $87 - 4(10 + x) = 27$

Example Meaning: If you started with 87 cookies, and made 4 plates to give away, each of which contained 10 cookies plus the same number of additional cookies (you can't remember how many), and you ended up with 27 cookies, how many additional cookies did you add to each plate?

c. $50 - (42 - x) = 16$

Example Meaning: If you spend \$50 at the store, and then return an item that cost \$42 minus a discount, the amount of which you can't remember, spending a total of \$16 after the return, what was the amount of the discount?

d. $12 - (x - 4) = -19$

e. In the example meaning in 3c, what does the x represent?

You may use a calculator on this worksheet whenever you see this symbol ( ).

1. Understanding Check

a. What is a square root?

b. True or false: The square root of a positive number could be either positive or negative.

c. In this course, unless instructed otherwise, when finding a square root, you should assume _____.

2. Finding the Square Root ( ) — Factor to find the requested square roots. List all of the prime factors as part of your answer. You may use a calculator to help you factor, but do not use the calculator's square root or root buttons.

a. $\sqrt{25}$

b. $\sqrt{196}$

c. $\sqrt{441}$

d. $\sqrt{900}$

e. $\sqrt{x}$, when x equals 121

3. Skill Sharpening ( )

a. Simplify, giving your answer in scientific notation (do not round): $4 \times 10^2 - 3 \times 10^{-1}$

b. Convert 2.67×10^{-5} to decimal notation. Do not round.

c. Simplify: $4x^2 + x^2$

d. Simplify: $4x^2x^2$

e. Simplify: $\frac{y^3}{y^2}$

f. What does 4^{-2} equal? Give your answer as a fraction, simplified as much as possible.

g. What does 2^{-3} equal? Give your answer as a fraction, simplified as much as possible.

You may use a calculator on this worksheet whenever you see this symbol ( ).

1. Rewriting with Exponents — Rewrite each of these square roots using exponents. Solve.

Example: $\sqrt{64} = \sqrt{8^2} = 8$

a. $\sqrt{49}$

b. $\sqrt{25}$

c. $\sqrt{81}$

d. $\sqrt{100}$

2. Finding the Square Root of Squares

Example: $\sqrt{x^2} = x$

a. $\sqrt{12^2}$

b. $\sqrt{3.5^2}$

c. $\sqrt{y^2}$

d. $\sqrt{c^2}$

3. Squaring a Square Root — Simplify. *Hint*: Remember, a square root means a number that, times itself, equals the quantity under the $\sqrt{}$ sign. So when we square a square root (i.e., multiply it by itself), we end up with the number under the square root sign.

Example: $(\sqrt{8})^2 = \sqrt{8} \bullet \sqrt{8} = 8$

a. $(\sqrt{64})^2$

b. $(\sqrt{21})^2$

c. $(\sqrt{101})^2$

d. $(\sqrt{x})^2$

4. Squaring Both Sides of an Equation — Find these unknowns by squaring both sides of these equations.

a. $\sqrt{x} = 9$

b. $\sqrt{x} = 4$

c. $\sqrt{x} = 2$

d. $\sqrt{x} = 5$

5. **Checking Your Work —** Go back and check your work in problems 4a–4d by substituting the value you obtained for x into the original equation. Show your work.

   a.

   b.

   c.

   d.

6. **Factoring (🖩) —** Factor to find the square root of 484. List all the prime factors as part of your answer. You may use a calculator, but do not use the calculator's square root or root buttons.

7. **Skill Sharpening (🖩)**

   a. Simplify, giving your answer in scientific notation (do not round): $4.7 \times 10^{-5} + 5.2 \times 10^{-4}$

      Example Meaning: the mass of two tiny particles added together

   b. Rewrite 4.2×10^{-7} in decimal notation. Do not round.

   c. Simplify: $(7a)(3a)(2a^2)$ *Hint*: Even though you've not seen a problem just like this one before, you have all the skills you need. Remember, multiplication is commutative and associative, so you can multiply in any order. Remember also that $a = a^1$.

   d. Simplify: $\frac{7a^2}{a^2}$ *Hint*: Again, you've not seen a problem exactly like this before, but you have the skills you need.

You may use a calculator on this worksheet whenever you see this symbol ( ).

1. **Taking the Square Root of Both Sides —** Find the unknown by taking the square root of both sides of these equations.

   a. $y^2 = 16$

   b. $v^2 = 169$

   c. If a square has an area of 256 in^2, what length is its sides?

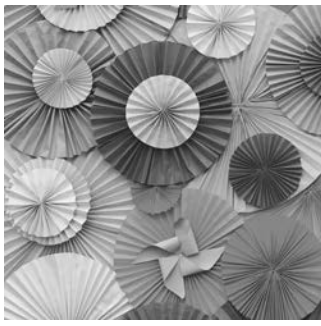
2. **Checking Your Work —** Go back and check your work in problems 1a–1c by substituting the value you obtained for x into the original equation. Show your work.

   a.

   b.

   c.

3. **Origami Paper Size —** If you need a square piece of paper with an area of 144 in^2 to make a specific origami pattern, what length should you make each side of the paper? *Hint*: The area of a square equals the length of one of the sides squared ($A = s^2$).



4. **Skill Sharpening ( ) —** Do not round your answers.

   a. Find the square root of 576 by factoring. List the prime factors as part of your answer. Do not use a calculator's square root or root buttons.

   b. Solve: $\sqrt{v} = 60$

   c. Solve: $2x^2 = 32$ *Hint*: This is another type of problem you've not seen before, but you have all the skills you need. Divide *both sides* by 2 and then take the square root of *both sides* to find x.

   d. Simplify, giving your answer in scientific notation: $\frac{4 \times 10^{-3}}{2 \times 10^{5}}$

You may use a calculator on this worksheet whenever you see this symbol ( ).

1. Approximating the Square Root — Between what two integers are each of these square roots?

Example: $\sqrt{18}$ = between 4 and 5

(4 • 4 is 16, and 5 • 5 is 25, so $\sqrt{18}$ is between 4 and 5.)

a. $\sqrt{83}$

b. $\sqrt{75}$

2. More Approximating the Square Root ( ) — Between what two integers are each of these square roots? You may use a calculator to help, but do not use the square root or root buttons.

Example: $\sqrt{250}$ = between 15 and 16

(15 • 15 is 225, and 16 • 16 is 256, so $\sqrt{250}$ is between 15 and 16.)

a. $\sqrt{475}$

b. $\sqrt{580}$

3. Finding the Square Root with a Calculator ( ) — Use the square root button to find an exact square root.

a. $\sqrt{420}$

b. $\sqrt{800}$

c. $\sqrt{1{,}265}$

4. Square Roots Applied ( )

a. If $c^2 = 780$, what does c equal?

b. If a square has an area of 108 in^2, what is the length of each side?

c. If a square has an area of 674 m^2, what is the length of each side?

5. Skill Sharpening

a. Convert to scientific notation (do not round): 0.000005678

b. Solve: $x \bullet x = 64$

c. Simplify: $2x^2 + 4x^2$

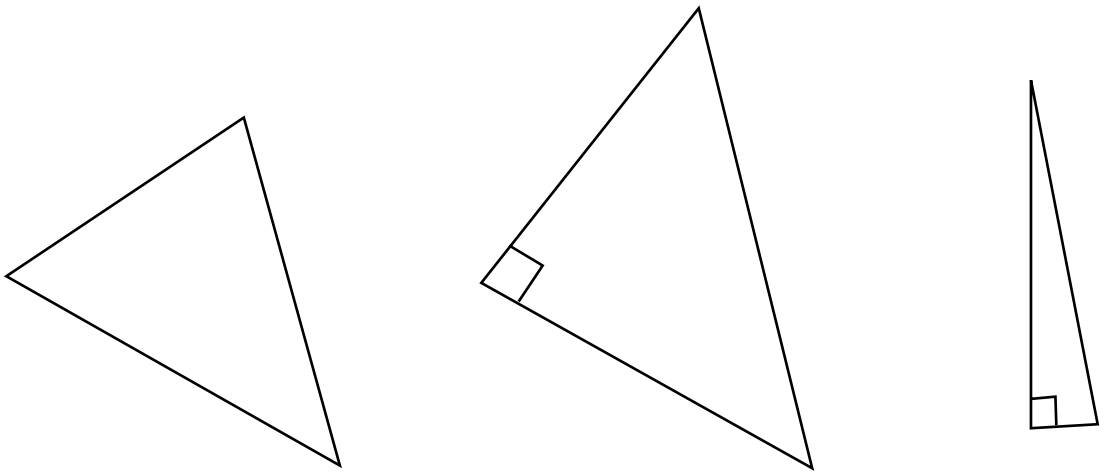
d. Simplify: x^4x^6

e. Factor to find the $\sqrt{1{,}225}$. List all of the prime factors as part of your answer.

5. Out of the Box: History of the Calculator — Research the history of calculators online or in an encyclopedia and write down one fact you discovered.

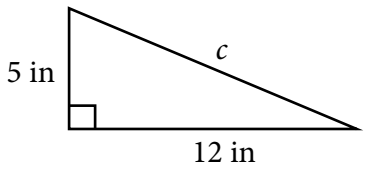
You may use a calculator on this worksheet whenever you see this symbol ( ).

1. Right Triangles — Circle all the right triangles shown (i.e., the triangles with a 90° angle). Put a star next to the legs and a dot next to the hypotenuse of each right triangle.

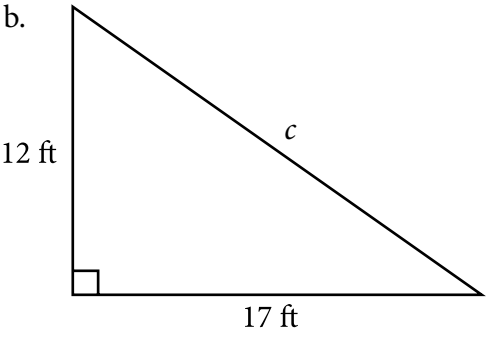


2. Pythagorean Theorem ( ) — Find the hypotenuse of these right triangles using the Pythagorean theorem.

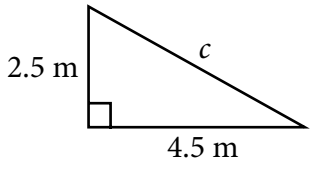
a.



b.



c.



d. A right triangle with 7 in and 9 in legs

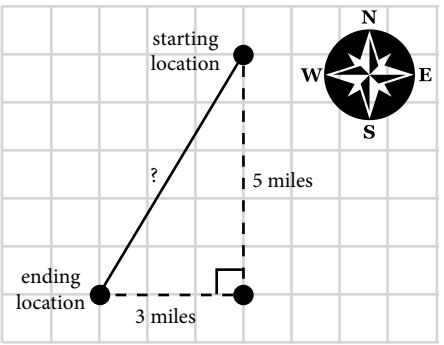
e. A right triangle with 6 m and 10 m legs

f. A right triangle with sides 8 m and 15 m long

3. Navigation[1] ( )

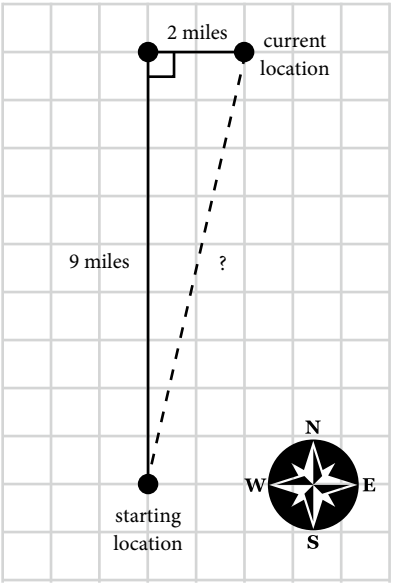
a. Suppose a sailor needs to travel to a location 5 miles to the south and 3 miles to the west of his current location. If he takes a diagonal line to that location, how far will he need to travel? *Hint*: Notice from the picture that we can think of the diagonal as the hypotenuse of a right triangle of which the sides are the distances south and west.

Use the Pythagorean theorem to find the hypotenuse, which in this case would find the distance the sailor needs to travel.

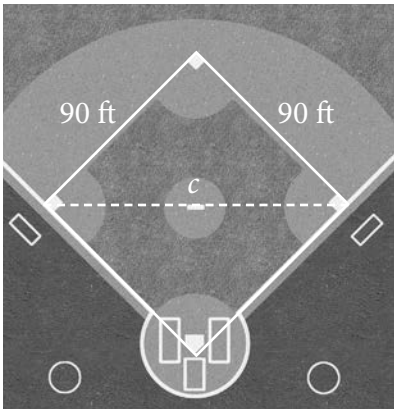


b. Suppose a sailor traveled 9 miles north and then 2 miles east. How far would it be to take a diagonal line back to his starting location?

c. How much shorter is it for the sailor in 3b to take a diagonal line than it would be to go back 9 miles south and 2 miles west (i.e., to travel along legs of the triangle instead of traveling along the hypotenuse)?



4. Baseball ( ) — If the distance between bases on a baseball diamond is 90 feet, how far is the throw from first base to third? *Hint*: You're trying to find the distance marked *c* in the picture.



5. Skill Sharpening ( )

a. Simplify: $5.79 \times 10^{25} + 6.5 \times 10^{25}$

Example Meaning: the sum of two distances in outer space

b. Find the two integers between which this square root lies; do not use the calculator's root or square root buttons: $\sqrt{640}$

c. Simplify, leaving your answer as a base raised to a power: $5^6(5^8)$

d. Simplify: x^6x^8

e. Factor to find the $\sqrt{1{,}296}$. List all of the prime factors as part of your answer. You may use a calculator to help you factor, but do not use the calculator's square root or root buttons.

1 Problem adapted from Katherine Loop, *Revealing Arithmetic: Math Concepts from a Biblical Worldview* (Fairfax, VA: Christian Perspective, 2010). Used with permission.

You may use a calculator on this worksheet whenever you see this symbol ( ).

1. Learning the Skill: Finding Unknowns with Exponents ( ) — Solve.

a. $x^2 + 25 = 155$

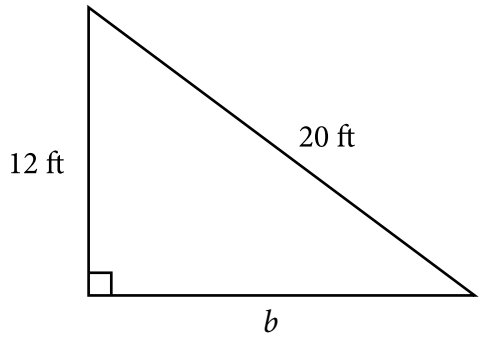
b. $-18 + x^2 = 300$

c. $58 + y^2 = 879$

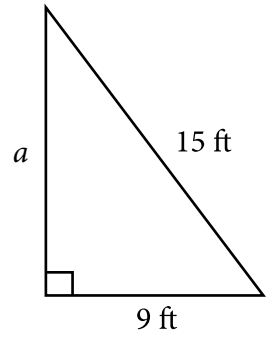
d. $5x^2 = 400$

2. Triangle Time ( ) — Use the Pythagorean theorem to find the missing sides of these right triangles.

a.

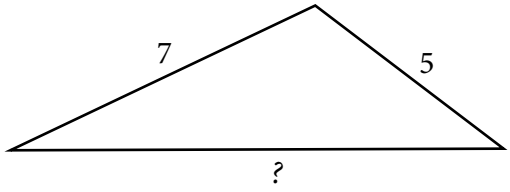


b.

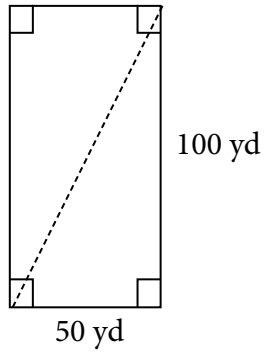


3. More Triangle Time ( )

a. Using the information given, can you use the Pythagorean theorem to find the length of the side of this triangle marked with a question mark? Why or why not?



b. You want to form a regulation size soccer field.[1] The length of the touchline has to be a minimum of 100 yards, while the width of the goal line has to be a minimum of 50 yards. If you make the field with these minimum dimensions and truly make the field with right angles, what will the length of the diagonal from one corner to the other corner be?



1 Dimmensions based on Fédération Internationale de Football Association, Laws of the Game, 2015–2016 (Zurich, Switzerland), p. 7, http://www.fifa.com/mm/Document/FootballDevelopment/Refereeing/02/36/01/11/LawsofthegamewebEN_Neutral.pdf .

c. Use the Pythagorean theorem to find the missing side of the triangle shown.

4. Skill Sharpening ( )

a. Simplify: $17.58(1 + 0.09)^{15}$

b. Solve: $2x^2 + 3x^2 = 100$

c. The square root of 245 is between what two integers? You may use a calculator to help approximate, but do not use the calculator's square root or root buttons.

d. Simplify: $\frac{4^5}{4^3}$

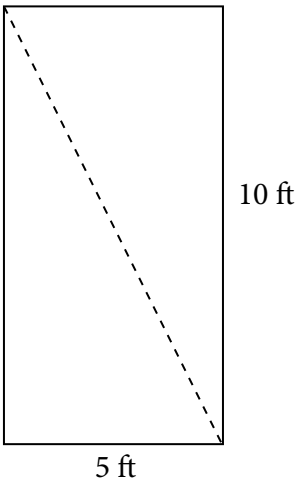
e. Simplify, giving your answer in scientific notation (do not round): $4.2 \times 10^{-5} + 2.33 \times 10^{2}$

f. Factor to find $\sqrt{1{,}024}$. List all of the prime factors as part of your answer. You may use a calculator to help you factor, but do not use the calculator's square root or root buttons.

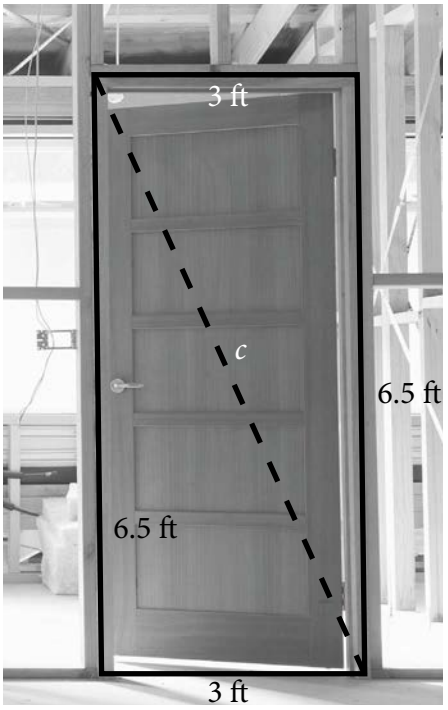
You may use a calculator on this worksheet whenever you see this symbol ( ).

1. Applying the Converse ( )

a. Suppose you're trying to mark off a rectangular garden in your yard. You want the length of the garden to be 10 ft, and the width 5 ft. How long should the diagonal from one corner to the opposite corner be if you really have laid out a rectangle?



b. Suppose you're framing a house, and you want to see if the doorway you're framing forms right angles. If the length measures at 6.5 ft and the width at 3 ft, what would the length marked c in the picture have to measure in order for the doorway to be built with right angles?



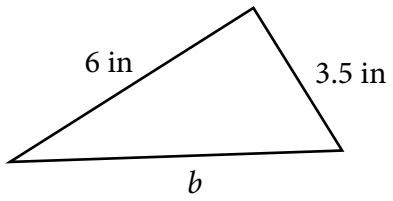
c. You measure the diagonal of the doorway in problem 1b, and it's 9 ft. Is the doorway laid out with right angles?

2. More with Triangles ( )

a. What is the hypotenuse of a right triangle with a 4 ft and 6 ft leg?

b. What is the missing side of a right triangle with one 10.5 in leg and a 20.5 in hypotenuse?

c. Can you find the missing leg of the triangle shown using the Pythagorean theorem? Why or why not?



3. Skill Sharpening ( )

a. Rewrite in scientific notation (do not round): 0.000000026147

b. Solve: $5x^2 + 3x^2 = 1{,}024$

c. Factor to find the $\sqrt{10{,}000}$. List all of the prime factors as part of your answer. You may use a calculator to help you factor, but do not use the calculator's square root or root buttons.

d. The square root of 750 is between what two integers? You may use a calculator to help approximate, but do not use the calculator's square root or root buttons.

e. Simplify: v^4v^2

You may use a calculator on this worksheet whenever you see this symbol ( ).

1. **Language Check**
   a. $\sqrt[6]{50}$ means the number that, times itself _____ times equals _____.

   b. In $\sqrt[6]{50}$, what is the radicand?

   c. In $\sqrt[6]{50}$, what is the index?

   d. Draw a radical sign.

2. **Finding Cubed Roots ( ) —** Factor to find the requested roots. List all of the prime factors as part of your answer. You may use a calculator to help you factor, but do not use the calculator's root button.
   a. $\sqrt[3]{8}$

   b. $\sqrt[3]{512}$

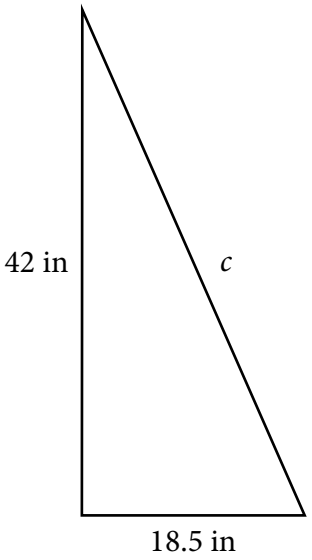
   c. $\sqrt[3]{216}$

3. **Geometry Time ( )**
   a. If the area of a square is 850 meters squared, what is the length of each of its sides?

   b. What will the length of a diagonal dividing the square in problem 3a into two right triangles be? Use the Pythagorean theorem to help you. Round to the nearest whole number.

   c. If the volume of a cube is 343 ft^3, what is the length of each of its sides? *Hint*: Just as we have been with square roots, we can take the cubed root of both sides of an equation without changing the meaning.

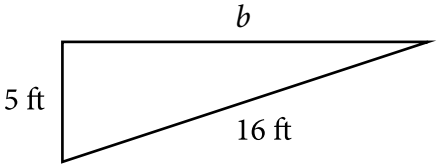
4. **Missing Sides ( )** — Find the length of the missing side of this right triangle.



5. **Skill Sharpening ( )**

   a. Simplify, giving your answer in scientific notation: $7.8 \times 10^{-6} - 5.2 \times 10^{-5}$

   b. What do you need to know before you can find the missing leg of this triangle using the Pythagorean theorem?



   c. Simplify: $4x^2x^3$

   d. Simplify: $\frac{4x^2}{x^3}$

6. **Challenge Problem ( )** — Here's another problem that's different than any you've seen yet. But you have all the skills you need to solve it.

   $3x^3 + 6x^3 + 6 = 1{,}131$

Principles of Mathematics 2
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 whether the students are learning the concepts and solving the problems carefully, correctly, and logically.
- **Different Arrangement —** When grading, keep in mind that you can swap the entire sides of an equation without changing the meaning. For example, $8 = x$ and $x = 8$ both mean the same thing and would be equally correct, unless the students were told specifically to arrange the equation a certain way.
- **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 of measure is given in the problem (dollars, feet, etc.), students need to include the unit of measure in their answer. For example, if a student lists "6" instead of "6 in" on a problem where the answer key lists "6 in," the student's answer is only partially correct. Watching units carefully will serve students well, both in real life and in upper-level courses.

- **Showing Steps —** While mental arithmetic should be encouraged, students will sometimes be instructed to show their work (there will be a note in the answer key letting you know this). Showing their work is especially important when students are first learning a skill, as they need to practice the process on simple problems so they'll be able to solve more advanced ones.

- **Word Problems —** Students should always write down the equation(s) they used to solve word problems so you can see what process they followed. Writing down enough steps that someone can see the process followed is a helpful habit to develop, as it makes it easier to find any errors.

- **Rounding —** Unless otherwise instructed, answers should be rounded to two decimal places. When using a calculator, students should not round until the final answer. When answers are written as a percent, the percent should be rounded to two decimal places.

  Example: 4.567 rounds to 4.57

  Example: 26.3574% rounds to 26.36%

  Be aware that an answer may still vary slightly from the one in the answer key due to differences in rounding. This is not typically a problem. The important thing is that students followed instructions (including any instructions given in the problem regarding rounding) and solved the problem accurately.

- **Fractions —** Fractional answers should be denoted in lowest terms, unless otherwise specified. This includes writing improper fractions as mixed numbers. Not only will this make it easier to grade and avoid confusion, it will also provide the student with practice forming equivalent fractions.

  If a problem is given with a fraction in it, students should list any partial quantities in their answer as a fraction so as to become proficient in working with fractions. There is an exception to this: if the problem includes both fractions and decimals, students may give their answer in either notation.

- **Pi (π) —** To keep grading simpler and to help students memorize the approximate value of π, students have been instructed to use 3.14 as the value for π when solving problems in this course.

Assigning a Grade

The grade column in the Suggested Schedule (p. 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.

Bonus Questions

Some quizzes include bonus questions, and the final test includes a project. It is up to you to decide how the bonus questions and project should affect the student's grade.

Additional Resources and Course Notes

Please see http://www.christianperspective.net/math/pom2 for links to helpful online resources, along with additional notes and information related to this course. There is also a way to ask questions there.

Chapter 1:

Worksheet 1.1

1. Math notebook should be prepped.
2. Student should have added terms to notebook and (optionally) made flashcards for them.
3. Answer should be 10 ways math applies outside of a textbook. See the "Where Did Math Originate?" section of Lesson 1.1 in the *Student Textbook* for ideas.
4. a. A worldview is a set of truths (or falsehoods we believe to be true) through which we interpret life.
   b. Math is a way of describing God's creation that works because of God's faithfulness.
   c. We find evidence of God's wisdom and care because a wise and caring God created all things very good, and we find evidence of suffering and death because this world is marred by sin and no longer the perfect world God created.
5. a. an expression
   b. 14
6. *Note on questions 6b and 6c*: Rounding was taught back in Book 1, Lesson 3.2. Please review if needed.
   a. I can use a calculator whenever I see the symbol  or when instructed to on a quiz or test.
   b. 0.54
   c. 0.9
   d. no
   e. whenever one is given
   f. Answer should be one of the study day suggestions given on p. 421 of this *Teacher Guide*.

Worksheet 1.2

Note: On this worksheet and the next, students will be reviewing a lot of the basics of arithmetic, including adding, subtracting, multiplying, and dividing both whole and decimal numbers. The book assumes students already know how to perform these mechanics; if they do not, do not start this book until they do.

1. a. name, identify, and order
   b. –, +, =, ≠
   c. Three of these methods should be listed: 20 x 6, 20 • 6, 20(6), (20)6
   d. Conventions are agreed-upon protocols or rules that aid us in communication.
2. a. 8 tens *or* eighty
   b. 8 hundredths *or* $\frac{8}{100}$
3. Students were told to both rewrite the multiplication with parentheses and solve.
   a. 5(6) = 30
   b. 2(105) = 210
4. Students were told to both rewrite the multiplication with a • and solve.
   a. 8 • 9 = 72
   b. 7 • 218 = 1,526
5. a. 8 – 3 + 2 =
   5 + 2 = 7
   b. (8 – 2)10 ÷ 2 =
   (6)10 ÷ 2 =
   60 ÷ 2 =
   30
   c. 7.5(0.23 + 0.96) – 1.8 =
   7.5(1.19) – 1.8 =
   8.925 – 1.8 =
   7.13
   d. $\overline{4)4 + 9 + 7} = \overline{4)20} = 5$
   e. 2.5 + 4.1(5.6 – 3) ÷ 2 =
   2.5 + 4.1(2.6) ÷ 2 =
   2.5 + 10.66 ÷ 2 =
   2.5 + 5.33 = 7.83
6. a. an expression
   b. 4.25

Worksheet 1.3

1. a. ≠
   b. =
   c. associative property of addition
   d. ≠
   e. =
   f. identity property of multiplication
   g. =
   h. identity property of addition
   i. =
   j. =
2. Check to make sure problems were solved using the distributive property.
   a. 9(15 + 22) =
   9(15) + 9(22) =
   135 + 198 = 333
   b. 5($8.45 + $3.99) =
   5($8.45) + 5($3.99) =
   $42.25 + $19.95 = $62.20
3. a. 256
   b. 256 ÷ 3 = 85.33
   c. $11.36
   d. $2,918.58

Worksheet 1.4

1. *total cost of Option B* = 50($5.50 + $25.30) + $50 = $1,590
   cost per employee of Option B = $1,590 ÷ 50 = $31.80
   difference in cost per employee = $32.50 – $31.80 = $0.70
   Option B is less expensive by $0.70 per employee.
2. *Plan A* = $76.45 + $19.99 + $19.99 = $116.43
   Plan B = 4($23.45 + $35.40) = $235.40
   difference in monthly cost = $235.40 – $116.43 = $118.97
3. *amount made = income – expenses*
   income = $6 + 3(280)($0.05) + $12 = $60
   expenses =
   $6 + 3.5($6.50) + (1,200 ÷ 100)$0.75 =
   $6 + $22.75 + (12)$0.75 =
   $28.75 + $9 = $37.75
   amount made = $60 – $37.75 = $22.25
4. a. 8 + (164)5 + 5 =

8 + 820 + 5 = 833

b. 88

c. 13 – 3 + 2 =
10 + 2 = 12

Worksheet 1.5

1. a. square
   b. circle
   c. octagon
   d. equilateral, acute triangle
   e. rectangle

2. a. $P = 6 \bullet 0.5 \text{ cm} = 3 \text{ cm}$
   b. $A = 8 \text{ ft} \bullet 8 \text{ ft} = 64 \text{ ft}^2$
   c. $V = (36 \text{ in} \bullet 13 \text{ in})(24 \text{ in}) = 11{,}232 \text{ in}^3$
   d. $A = (9.5 \text{ in})(3.3\text{in}) = 31.35 \text{ in}^2$

3. a. a shorthand way of representing repeated multiplication
   b. 8 • 8 *or* 8(8)
   c. ft • ft *or* ft(ft)

4. a. "a mathematical relationship or rule expressed in symbols."[1]
   b. $P = 120 \text{ volts} \bullet 25 \text{ amps} = 3{,}000 \text{ volts} \bullet \text{amps} = 3{,}000$ watts
   c. length
   d. \$62.54 + \$587.89 = \$650.43
   e. \$56.15 – \$19.29 = \$36.86

5. Geometry means "earth measure."

Worksheet 2.1

1. Students were told they did not need to include units of measure.
   a. $\frac{58}{3}$
   b. $19\frac{1}{3}$
   c. $\frac{4}{3}$
   d. $\frac{45}{5}$
   e. 3
   f. 11
   g. Students should give an example meaning for $\frac{50}{6}$.
   Suggestions: 50 dollars divided by 6 people, 50 miles divided by 6 hours, 50 days divided by 6, etc.
   h. 0.6
   i. 1.33
   j. $\frac{16}{2} = 8$

2. $A = (6 \text{ ft})(8 \text{ ft}) = 48 \text{ ft}^2$
   $48 \bullet \$23.50 = \$1{,}128$

Worksheet 2.2

1. Factor trees may vary slightly, but the circled numbers should be the same.

   a.
   ```
      26
      ^
   13 • 2◯
   ```

   b.
   ```
      54
      ^
    9 • 6
    ^   ^
   3•3◯2•3◯
   ```

2. a. Yes; they both represent the same quantity. They both simplify to $\frac{1}{2}$ or 0.5.
   b. No; they do not represent the same quantity.

3. a. $56 = 2 \bullet 2 \bullet 2 \bullet 7$
   $36 = 2 \bullet 2 \bullet 3 \bullet 3$
   $\text{GCF} = 2 \bullet 2 = 4$
   b. $\frac{36}{56} \div \frac{4}{4} = \frac{9}{14}$
   c. $60 = 2 \bullet 2 \bullet 3 \bullet 5$
   $40 = 2 \bullet 2 \bullet 2 \bullet 5$
   $\text{GCF} = 2 \bullet 2 \bullet 5 = 20$
   d. $\frac{40}{60} \div \frac{20}{20} = \frac{2}{3}$

4. a. $\frac{1}{32}$
   Note: Notice that the units of measure canceled out.
   b. 22 ft
   Note: Canceling the units of measure left us with an answer in ft.

5. a. $\frac{2 \bullet 2 \bullet 3 \bullet 47}{2 \bullet 2 \bullet 2 \bullet 5 \bullet 5 \bullet 5}$
   b. Two 2s in the fraction in problem 3a should be circled in both the numerator and the denominator.
   c. 4
   (The greatest common factor is the result of multiplying all the common prime factors—in this case, 2 • 2—together.)
   d. $\frac{564}{1{,}000} \div \frac{4}{4} = \frac{141}{250}$

6. a. $\frac{60 \text{ ft}^2}{7 \text{ ft}}$
   b. $8\frac{4}{7}$ ft
   c. 8.57 ft

Worksheet 2.3

1. a. $\frac{7}{10} + \frac{2}{5} =$
   $\frac{7}{10} + \frac{4}{10} = \frac{11}{10} =$
   $1\frac{1}{10}$
   b. $5\frac{1}{2} + 6\frac{2}{3} =$
   $5\frac{3}{6} + 6\frac{4}{6} =$
   $11\frac{7}{6} =$
   $12\frac{1}{6}$
   c. $\frac{8}{9} - \frac{3}{6} =$
   $\frac{16}{18} - \frac{9}{18} = \frac{7}{18}$
   d. $1\frac{1}{3} - \frac{2}{7} =$
   $\frac{4}{3} - \frac{2}{7} =$
   $\frac{28}{21} - \frac{6}{21} =$
   $\frac{22}{21} = 1\frac{1}{21}$

2. Check to make sure student simplified while completing the multiplication when possible.
   a. $4 \bullet \frac{2}{3} =$
   $\frac{8}{3} = 2\frac{2}{3}$
   b. $\frac{8}{7} \bullet \frac{14^{2}}{24_{3}} = \frac{2}{3}$

1 *New Oxford American Dictionary*, 3rd ed. (Oxford University Press, 2012), Version 2.2.1 (156) (Apple, 2011), s.v., "formula."

multiplying them by $\frac{3}{2}$)

c. $2a = 6$ (combined like terms)
$a = 3$ (divided both sides by 2)

d. Students were instructed to show their work.
$7(3) - 5(3) = 6$
$21 - 15 = 6$
$6 = 6$

6. a. $9x - 3x = \$96$
$6x = \$96$ (combined like terms)
$x = \$16$ (divided both sides by 6)

b. $x - \frac{1}{4}x = 15$
$\frac{4}{4}x - \frac{1}{4}x = 15$
$\frac{3}{4}x = 15$ (combined like terms)
$x = 20$ (divided both sides by $\frac{3}{4}$ by multiplying them by $\frac{4}{3}$)

7. true

(We know from the identity property of multiplication that multiplying by 1 doesn't change the value of a quantity.)

Worksheet 8.4

1. Students were instructed to show their work.
a. $-x = -5$ (added –17 to both sides)
$(-1)(-x) = (-5)(-1)$
$x = 5$
b. $-x = -23.91$ (added –26.45 to both sides)
$(-1)(-x) = (-23.91)(-1)$
$x = 23.91$
c. $-x = -21.43$ (added –56.99 to both sides)
$(-1)(-x) = (-21.43)(-1)$
$x = 21.43$
d. $56.99 - 21.43 = 35.56$
$35.56 = 35.56$

2. a. $\frac{5}{5}x - \frac{4}{5}x = \frac{1}{5}x$ (combined like terms)
b. $10x = 10{,}560$ ft (combined like terms)
$x = 1{,}056$ ft (divided both sides by 10)
c. $4.5x = 550$ (combined like terms)
$x = 122.22$ (divided both sides by 4.5)
d. $2x + 50 = 60$ (combined like terms)
$2x = 10$ (added –50 to both sides)
$x = 5$ (divided both sides by 2)
e. $\frac{8}{8}x - \frac{7}{8}x = 18$
$\frac{1}{8}x = 18$ (combined like terms)
$x = 144$ (divided both sides by $\frac{1}{8}$ by multiplying them by $\frac{8}{1}$)
f. b = 25 (divided both sides by –9)
g. $x = a + y$ (added y to both sides)

Worksheet 8.5

1. On problems 1c and 1e, students were instructed to show their work.
a. $5w = 120 \text{ ft} + 2w$
$3w = 120$ ft (added $-2w$ to both sides)
$w = 40$ ft (divided both sides by 3)
b. $150 = 30x$ (added $-x$ to both sides)
$5 = x$ (divided both sides by 30)
c. $5 + 150 = 31(5)$
$155 = 155$
d. $34 = 17x$ (added x to both sides)
$2 = x$ (divided both sides by 17)
e. $34 - 2 = 16(2)$
$32 = 32$

2. a. $-x = -62$ (added –16 to both sides)
$x = 62$ (multiplied both sides by –1)
b. $7x = 469$ (combined like terms)
$x = 67$ (divided both sides by 7)
c. $2x = 45$ (combined like terms)
$x = 22.5$ (divided both sides by 2)
d. $x + \frac{1}{4}x = \$560$
$\frac{4}{4}x + \frac{1}{4}x = \$560$
$\frac{5}{4}x = \$560$ (combined like terms)
$x = \$448$ (divided both sides by $\frac{5}{4}$ by multiplying them by $\frac{4}{5}$)
e. $\frac{1}{4}(\$448) = \$112$
(We knew that the bonus was $\frac{1}{4}$ of the weekly salary, so we multiplied the weekly salary we found in 2d by $\frac{1}{4}$.)
f. $a = c + x$ (added x to both sides)
g. $8 - -6 =$
$8 + 6 = 14$

Worksheet 9.1

1. Students were told to use decimals rather than fractions to represent partial quantities in the answers.
a. $C = \frac{5}{9}(80° - 32°)$
$C = 26.67°$
b. $C = \frac{5}{9}(20° - 32°)$
$C = -6.67°$
c. $C = \frac{5}{9}(32° - 32°)$
$C = 0°$

2. a. $2[3(9)] =$
$2[27] =$
54
b. $6[4 + 3(3)] =$
$6[4 + 9] =$
$6[13] =$
78

3. Check to make sure parentheses were used in writing each problem.
a. $9(\$4.50 + \$5)$
b. $0.04(\$7 + \$9.24)$

4. a. $9(\$9.50) = \$85.50$
b. $0.04(\$16.24) = \$0.65$

5. a. $3x - x = \$15$
$2x = \$15$ (combined like terms)
$x = \$7.50$ (divided both sides by 2)
b. $4x + 2x = \$480$
$6x = \$480$ (combined like terms)
$x = \$80$ (divided both sides by 6)
c. $\frac{24}{8}x - \frac{2}{8}x = 40$
$\frac{22}{8}x = 4$ (combined like terms)

$x = \frac{32}{22} = 1\frac{10}{22} = 1\frac{5}{11}$ (divided both sides by $\frac{22}{8}$ by multiplying them by $\frac{8}{22}$)

d. $-y = 32.8$ (added –75.2 to both sides)
$y = -32.8$ (multiplied both sides by –1)

Worksheet 9.2

1. Check to make sure problems were solved using the order of operations.
   a. $4(15) = 60$
   b. $\frac{5}{9}(\frac{24}{20} + \frac{3}{20}) =$
   $\frac{5}{9}(\frac{27}{20}) =$
   $\frac{\cancel{5}}{\cancel{9}_3}(\frac{\cancel{27}^3}{\cancel{20}_4}) = \frac{3}{4}$
   c. $2(-2) = -4$
   d. $4(2) = 8$
2. Check to make sure problems were solved using the distributive property.
   a. $4(5) + 4(10) = 20 + 40 = 60$
   b. $\frac{5}{9}(\frac{6}{5}) + \frac{5}{9}(\frac{3}{20}) =$
   $\frac{2}{3} + \frac{1}{12} =$
   $\frac{8}{12} + \frac{1}{12} =$
   $\frac{9}{12} = \frac{3}{4}$
   c. $2(6 + -8)$
   $2(6) + 2(-8) =$
   $12 + -16 = -4$
   d. $4(6 + -4)$
   $4(6) + 4(-4) =$
   $24 + -16 = 8$
3. a. $5x + 5(2) = 30$
   $5x + 10 = 30$
   $5x = 20$ (added –10 to both sides)
   $x = 4$ (divided both sides by 5)
   b. $4(6 + x) = 48$
   $4(6) + 4x = 48$
   $24 + 4x = 48$
   $4x = 24$ (added –24 to both sides)
   $x = 6$ (divided both sides by 4)
   c. $4(x + -2) = 28$
   $4x + 4(-2) = 28$
   $4x + -8 = 28$
   $4x = 36$ (added 8 to both sides)
   $x = 9$ (divided both sides by 4)
   d. $15(\$12 + -x) = \$120$
   $15(\$12) + 15(-x) = \$120$
   $\$180 + -15x = \$120$
   $-15x = -\$60$ (added –$180 to both sides)
   $x = \$4$ (divided both sides by –15)
   e. $4(\frac{3}{4}) + 4x = 11$
   $3 + 4x = 11$
   $4x = 8$ (added –3 to both sides)
   $x = 2$ (divided both sides by 4)
   f. $(7 + x)3 = 30$
   $(7)3 + 3x = 30$
   $21 + 3x = 30$
   $3x = 9$ (added –21 to both sides)
   $x = 3$ (divided both sides by 3)
4. Students were instructed to write each problem using parentheses.
   a. $10(\$1.50 + \$4.50) =$
   $10(\$6) = \$60$
   b. $10(\$2 + x) = \$50$
   $\$20 + 10x = \$50$
   $10x = \$30$ (added –$20 to both sides)
   $x = \$3$ (divided both sides by 10)
   c. $5(\$7 + \$10) =$
   $5(\$17) = \$85$
   d. $5(\$7 + x) = \$75$
   $\$35 + 5x = \$75$
   $5x = \$40$ (added –$35 to both sides)
   $x = \$8$ (divided both sides by 5)
5. a. $15° = \frac{5}{9}(F + -32°)$
   $15° = \frac{5}{9}(F) + \frac{5}{9}(-32°)$
   $15° = \frac{5}{9}F + -\frac{160}{9}°$
   $\frac{295}{9}° = \frac{5}{9}F$ (added $\frac{160}{9}°$ to both sides)
   $59° = F$ (divided both sides by $\frac{5}{9}$ by multiplying them by $\frac{9}{5}$)
   b. $100° = \frac{5}{9}(F + -32°)$
   $100° = \frac{5}{9}(F) + \frac{5}{9}(-32°)$
   $100° = \frac{5}{9}F + -\frac{160}{9}°$
   $\frac{1{,}060}{9}° = \frac{5}{9}F$ (added $\frac{160}{9}°$ to both sides)
   $212° = F$ (divided both sides by $\frac{5}{9}$ by multiplying them by $\frac{9}{5}$)

Worksheet 9.3

1. Check to make sure problems were solved using the distributive property.
   a. $4 + 1(5 + 6) =$
   $4 + 1(5) + 1(6) =$
   $4 + 5 + 6 = 15$
   b. $20 + 1(43 + -5) =$
   $20 + 1(43) + 1(-5) =$
   $20 + 43 + -5 = 58$
2. a. $8 + 3 + x = 30$
   $11 + x = 30$
   $x = 19$ (added –11 to both sides)
   b. $\$15 + \$35 - x = \$25$
   $\$50 - x = \$25$
   $-x = -\$25$ (added –$50 to both sides)
   $x = \$25$ (multiplied both sides by –1)
   c. the amount spent on dinner
3. a. $8 + (3 + 19) = 30$
   $30 = 30$
   b. $\$15 + (\$35 - \$25) = \$25$
   $\$25 = \$25$
4. a. $1.5x = 39$ (added $-x$ to both sides)
   $x = 26$ (divided both sides by 1.5)
   b. $4(3 - 1)$
   c. $4(2) = 8$
   d. $4(x - 1) = 60$
   e. $4(x + -1) = 60$

$4x + -4 = 60$
$4x = 64$ (added 4 to both sides)
$x = 16$ (divided both sides by 4)

Worksheet 9.4

1. a. *second boy's earnings*
   b. \$150
   c. $\$1{,}200 = (x + \$150) + x$
   d. $\$1{,}200 = 2x + \$150$ (removed parentheses and combined like terms)
   $\$1{,}050 = 2x$ (added $-\$150$ to both sides)
   $\$525 = x$ (divided both sides by 2)
   e. $\$1{,}200 = (\$525 + \$150) + \$525$
   $\$1{,}200 = \$1{,}200$
   f. *first boy's earnings* $= x + \$150$
   first boy's earnings $= \$525 + \$150 = \$675$

2. a. $6x + 18 = 25$
   $6x = 7$ (added -18 to both sides)
   $x = 1.17$ (divided both sides by 6)
   b. $2(x + -2) = 20$
   $2x + -4 = 20$
   $2x = 24$ (added 4 to both sides)
   $x = 12$ (divided both sides by 2)
   c. $5x + 10 = 15x$
   $10 = 10x$ (added $-5x$ to both sides)
   $1 = x$ (divided both sides by 10)
   d. $\frac{3}{4}(5 + -x) = 3$
   $\frac{15}{4} + -\frac{3}{4}x = 3$
   $-\frac{3}{4}x = -\frac{3}{4}$ (added $-\frac{15}{4}$ to both sides)
   $x = 1$ (divided both sides by $-\frac{3}{4}$ by multiplying them both by $-\frac{4}{3}$)
   e. $1.06(\$9 + -x) = \$5.13$
   $1.06(\$9) + 1.06(-x) = \$5.13$
   $\$9.54 + -1.06x = \$5.13$
   $-1.06x = -\$4.41$ (added -9.54 to both sides)
   $x = \$4.16$ (divided both sides by -1.06)
   f. $2(24 \text{ in} + 2 \text{ in})$
   g. $2(26 \text{ in}) = 52 \text{ in}$
   h. $5[(7.5)5] =$
   $5[37.5] = 187.5$
   i. $2x + 8 = 0$ (added $-2x$ to both sides)
   $2x = -8$ (added -8 to both sides)
   $x = -4$ (divided both sides by 2)
   j. $2x + 0.1x = \$800$
   $2.1x = \$800$ (combined like terms)
   $x = \$380.95$ (divided both sides by 2.1)

Worksheet 9.5

1. Check to make sure problems were solved using the order of operations.
   a. $-3(14) = -42$
   b. $3 - (7) = -4$
   c. $37 - (6) = 31$

2. Check to make sure problems were solved using the distributive property.
   a. $-3(5) + -3(7) + -3(2) =$
   $-15 + -21 + -6 = -42$
   b. $3 + -1(9 + -2) =$
   $3 + -1(9) + -1(-2) =$
   $3 + -9 + 2 = -4$
   c. $37 + -1(10 + -4) =$
   $37 + -1(10) + -1(-4) =$
   $37 + -10 + 4 = 31$

3. a. $-4(\$2) + -4x = -\$28$
   $-\$8 + -4x = -\$28$
   $-4x = -\$20$ (added \$8 to both sides)
   $x = \$5$ (divided both sides by -4)
   b. $87 + -4(10 + x) = 27$
   $87 + -4(10) + -4x = 27$
   $87 - 40 + -4x = 27$
   $47 + -4x = 27$
   $-4x = -20$ (added -47 to both sides)
   $x = 5$ (divided both sides by -4)
   c. $50 + -1(42 + -x) = 16$
   $50 + -1(42) + -1(-x) = 16$
   $50 + -42 + x = 16$
   $8 + x = 16$
   $x = 8$ (added -8 to both sides)
   d. $12 + -1(x + -4) = -19$
   $12 + -1(x) + -1(-4) = -19$
   $12 + -x + 4 = -19$
   $16 + -x = -19$
   $-x = -35$ (added -16 to both sides)
   $x = 35$ (multiplied both sides by -1)
   e. the discount

Worksheet 10.1

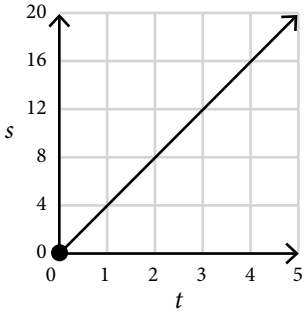
1. a. $7 < 8$
   b. $8 > 7$
   c. *income* $\leq \$6{,}000$
   d. *hours worked* ≥ 40
   e. *time* $\neq 0$

2. no
   (Lesson 10.1 in the *Student Textbook* showed other less than symbols that have also been used.)

3. a. $3x = 256$ (combined like terms)
   $x = 85.33$ (divided both sides by 3)
   b. $-x = -53$ (added -8 to both sides)
   $x = 53$ (multiplied both sides by -1)
   c. $\frac{6}{6}x + \frac{5}{6}x = 110$
   $\frac{11}{6}x = 110$ (combined like terms)
   $x = 60$ (divided both sides by $\frac{11}{6}$ by multiplying them by $\frac{6}{11}$)
   d. the speed Betty can type
   e. $20(\$10 + \$12 - \$2)$
   f. $20(\$20) = \$400$

4. a. *nickels* $= \$0.05x$
   pennies $= \$0.01x$
   b. $\$0.10x + \$0.05x + \$0.01x = \$0.80$
   c. $\$0.16x = \$0.80$ (combined like terms)
   $x = 5$ (divided both sides by \$0.16)
   d. $\$0.10(5) + \$0.05(5) + \$0.01(5) = \$0.80$
   $\$0.50 + \$0.25 + \$0.05 = \$0.80$
   $\$0.80 = \$0.80$

5. Graph may vary in scale.



6. a. 10
   b. 5
   c. $y = 5x + 10$, where $x > 0$

7. a. 1
   b. $\frac{1}{4^3} = \frac{1}{64}$
   c. $4 + 5 \bullet 20 =$
   $4 + 100 = 104$
   d. $\frac{1}{125}$
   e. $2 \bullet 8 \bullet 1{,}296 = 20{,}736$
   f. $v^{2+6} = v^8$
   g. $v^{8-4} = v^4$ or $\frac{v^8}{v^4} = v^4$
   h. cannot be simplified
   i. $4x^2$
   j. cannot be simplified

8. a. $4(5)^8 = 4(390{,}625) = 1{,}562{,}500 = 1.56 \times 10^6$
   b. $15(8.03)^{25} = 6.22 \times 10^{23}$
   c. $0.000000209 = 2.09 \times 10^{-7}$
   d. 9.66×10^7

9. a. $x + -125 = 50$ (simplified exponent)
   $x = 175$ (added 125 to both sides)
   b. $x + \frac{1}{8} = 25$ (simplified exponent)
   $x = 24\frac{7}{8}$ or 24.88 (added $-\frac{1}{8}$ to both sides)

10. a. $24{,}873.6 \text{ mi} = 2(3.14)r$
    $24{,}873.6 \text{ mi} = 6.28r$
    $3{,}960.76 \text{ mi} = r$ (divided both sides by 6.28)
    b. $V = \frac{4}{3}(3.14)(3{,}960.76 \text{ mi})^3$
    $V = 2.60 \times 10^{11} \text{ mi}^3$

11. $P = 4(1 + 0.04)^{60}$
    $P = 42.08$ beetles
    $P = 42$ beetles (rounded per instructions)

Worksheet 17.1

1. a. A square root is a way of concisely asking for the number that, times itself, will equal the number given.
   b. true
   c. a positive square root is meant

2. Check that both the prime factors are listed and the square roots.
   a. *prime factors* = 5 • 5
   square root = 5
   b. *prime factors* = 2 • 2 • 7 • 7
   square root = 2 • 7 = 14
   Note: We found the square root by grouping the prime factors into the factor that, multiplied by itself, equals 196.
   $(2 \bullet 7)(2 \bullet 7) = (14)(14) = 196$
   c. *prime factors* = 3 • 3 • 7 • 7
   square root = 3 • 7 = 21
   d. *prime factors* = 2 • 2 • 3 • 3 • 5 • 5
   square root = 2 • 3 • 5 = 30
   e. *prime factors* = 11 • 11
   square root = 11

3. a. 3.997×10^2
   b. 0.0000267
   c. $5x^2$
   d. $4x^4$
   e. $y^{3-2} = y^1 = y$ or
   $\frac{y^3}{y^2} = y^{3-1} = y^1 = y$
   f. $\frac{1}{16}$
   g. $\frac{1}{8}$

Worksheet 17.2

1. Check that the square roots are both rewritten with exponents and solved.
   a. $\sqrt{7^2} = 7$
   b. $\sqrt{5^2} = 5$
   c. $\sqrt{9^2} = 9$
   d. $\sqrt{10^2} = 10$

2. a. 12
   b. 3.5
   c. y
   d. c

3. a. 64
   b. 21
   c. 101
   d. x

4. a. $(\sqrt{x})^2 = (9)^2$
   $x = 81$
   b. $(\sqrt{x})^2 = (4)^2$
   $x = 16$
   c. $(\sqrt{x})^2 = (2)^2$
   $x = 4$
   d. $(\sqrt{x})^2 = (5)^2$
   $x = 25$

5. a. $\sqrt{81} = 9$
   $9 = 9$
   b. $\sqrt{16} = 4$
   $4 = 4$
   c. $\sqrt{4} = 2$
   $2 = 2$
   d. $\sqrt{25} = 5$
   $5 = 5$

6. *prime factors* = 2 • 2 • 11 • 11
   square root = 2 • 11 = 22

7. a. 5.67×10^{-4}
   b. 0.00000042
   c. $42a^4$
   d. $7a^{2-2} = 7a^0 = 7(1) = 7$

or

$\frac{7a^2}{a^2} = 7$

Note: Any number raised to the zeroth power equals 1.

Worksheet 17.3

1. a. $y = 4$ (took the square root of both sides)

   b. $v = 13$ (took the square root of both sides)

   c. $s^2 = 256\ \text{in}^2$

   $s = 16\ \text{in}$ (took the square root of both sides)

2. a. $4^2 = 16$

   $16 = 16$

   b. $13^2 = 169$

   $169 = 169$

   c. $(16\ \text{in})^2 = 256\ \text{in}^2$

   $256\ \text{in}^2 = 256\ \text{in}^2$

3. $144\ \text{in}^2 = s^2$

   $12\ \text{in} = s$ (took the square root of both sides)

4. a. *prime factors* = 2 • 2 • 2 • 2 • 2 • 2 • 3 • 3

   square root = 2 • 2 • 2 • 3 = 24

   b. $v = 60^2$ (squared both sides)

   $v = 3{,}600$

   c. $x^2 = 16$ (divided both sides by 2)

   $x = 4$ (took the square root of both sides)

   d. 2×10^{-8}

Worksheet 17.4

1. a. 9 and 10

   b. 8 and 9

2. a. 21 and 22

   b. 24 and 25

3. a. 20.49

   b. 28.28

   c. 35.57

4. a. $c = 27.93$

   b. $108\ \text{in}^2 = s^2$

   $10.39\ \text{in} = s$ (took the square root of both sides)

   c. $674\ \text{m}^2 = s^2$

   $25.96\ \text{m} = s$ (took the square root of both sides)

5. a. 5.678×10^{-6}

   b. $x^2 = 64$

   $x = 8$ (took the square root of both sides)

   c. $6x^2$

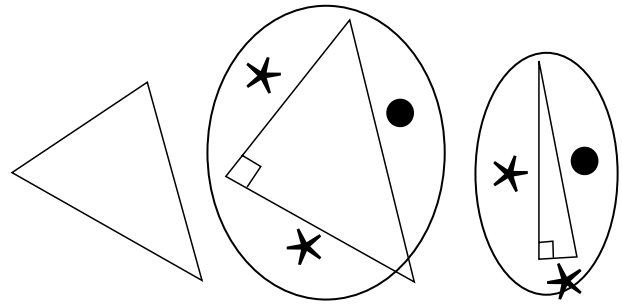
   d. $x^{4+6} = x^{10}$

   e. *prime factors* = 5 • 5 • 7 • 7

   square root = 5 • 7 = 35

5. Students should have written down one fact about the history of calculators.

Worksheet 17.5

1. 

2. a. $(5\ \text{in})^2 + (12\ \text{in})^2 = c^2$

   $25\ \text{in}^2 + 144\ \text{in}^2 = c^2$

   $169\ \text{in}^2 = c^2$

   $\sqrt{169\ \text{in}^2} = \sqrt{c^2}$

   $13\ \text{in} = c$

   b. $(12\ \text{ft})^2 + (17\ \text{ft})^2 = c^2$

   $144\ \text{ft}^2 + 289\ \text{ft}^2 = c^2$

   $433\ \text{ft}^2 = c^2$

   $\sqrt{433\ \text{ft}^2} = \sqrt{c^2}$

   $20.81\ \text{ft} = c$

   c. $(2.5\ \text{m})^2 + (4.5\ \text{m})^2 = c^2$

   $6.25\ \text{m}^2 + 20.25\ \text{m}^2 = c^2$

   $26.5\ \text{m}^2 = c^2$

   $\sqrt{26.5\ \text{m}^2} = \sqrt{c^2}$

   $5.15\ \text{m} = c$

   d. $(7\ \text{in})^2 + (9\ \text{in})^2 = c^2$

   $49\ \text{in}^2 + 81\ \text{in}^2 = c^2$

   $130\ \text{in}^2 = c^2$

   $\sqrt{130\ \text{in}^2} = \sqrt{c^2}$

   $11.4\ \text{in} = c$

   e. $(6\ \text{m})^2 + (10\ \text{m})^2 = c^2$

   $36\ \text{m}^2 + 100\ \text{m}^2 = c^2$

   $136\ \text{m}^2 = c^2$

   $\sqrt{136\ \text{m}^2} = \sqrt{c^2}$

   $11.66\ \text{m} = c$

   f. $(8\ \text{m})^2 + (15\ \text{m})^2 = c^2$

   $64\ \text{m}^2 + 225\ \text{m}^2 = c^2$

   $289\ \text{m}^2 = c^2$

   $\sqrt{289\ \text{m}^2} = \sqrt{c^2}$

   $17\ \text{m} = c$

3. a. $(3\ \text{mi})^2 + (5\ \text{mi})^2 = c^2$

   $9\ \text{mi}^2 + 25\ \text{mi}^2 = c^2$

   $34\ \text{mi}^2 = c^2$

   $\sqrt{34\ \text{mi}^2} = \sqrt{c^2}$

   $5.83\ \text{mi} = c$

   b. $(9\ \text{mi})^2 + (2\ \text{mi})^2 = c^2$

   $81\ \text{mi}^2 + 4\ \text{mi}^2 = c^2$

   $85\ \text{mi}^2 = c^2$

   $\sqrt{85\ \text{mi}^2} = \sqrt{c^2}$

   $9.22\ \text{mi} = c$

   c. $(9\ \text{mi} + 2\ \text{mi}) - 9.22\ \text{mi} = 11\ \text{mi} - 9.22\ \text{mi} = 1.78\ \text{mi}$

4. $(90\ \text{ft})^2 + (90\ \text{ft})^2 = c^2$

   $8{,}100\ \text{ft}^2 + 8{,}100\ \text{ft}^2 = c^2$

   $16{,}200\ \text{ft}^2 = c^2$

   $\sqrt{16{,}200\ \text{ft}^2} = \sqrt{c^2}$

   $127.28\ \text{ft} = c$

5. a. $5.79 \times 10^{25} + 6.5 \times 10^{25} = 12.29 \times 10^{25}$

b. 25 and 26
c. $5^{6+8} = 5^{14}$
d. $x^{6+8} = x^{14}$
e. *prime factors* = 2 • 2 • 2 • 2 • 3 • 3 • 3 • 3
square root = 2 • 2 • 3 • 3 = 36

Worksheet 17.6

1. a. $x^2 = 130$ (added –25 to both sides)
$x = 11.4$ (took the square root of both sides)
b. $x^2 = 318$ (added 18 to both sides)
$x = 17.83$ (took the square root of both sides)
c. $y^2 = 821$ (added –58 to both sides)
$y = 28.65$ (took the square root of both sides)
d. $x^2 = 80$ (divided both sides by 5)
$x = 8.94$

2. a. $(12 \text{ ft})^2 + b^2 = (20 \text{ ft})^2$
$144 \text{ ft}^2 + b^2 = 400 \text{ ft}^2$
$b^2 = 256 \text{ ft}^2$ (added -144 ft^2 to both sides)
$\sqrt{b^2} = \sqrt{256 \text{ ft}^2}$
$b = 16$ ft
b. $a^2 + (9 \text{ in})^2 = (15 \text{ in})^2$
$a^2 + 81 \text{ in}^2 = 225 \text{ in}^2$
$a^2 = 144 \text{ in}^2$ (added -81 in^2 to both sides)
$\sqrt{a^2} = \sqrt{144 \text{ ft}^2}$
$a = 12$ ft

3. a. No; we don't know if the triangle is a right triangle.
b. $(50 \text{ yd})^2 + (100 \text{ yd})^2 = c^2$
$2{,}500 \text{ yd}^2 + 10{,}000 \text{ yd}^2 = c^2$
$12{,}500 \text{ yd}^2 = c^2$
$\sqrt{12{,}500 \text{ yd}^2} = \sqrt{c^2}$
$111.8 \text{ yd} = c$
c. $(5.6 \text{ ft})^2 + (5 \text{ ft})^2 = c^2$
$31.36 \text{ ft}^2 + 25 \text{ ft}^2 = c^2$
$56.36 \text{ ft}^2 = c^2$
$\sqrt{56.36 \text{ ft}^2} = \sqrt{c^2}$
$7.51 \text{ ft} = c$

4. a. $17.58(1.09)^{15} = 64.03$
b. $5x^2 = 100$ (combined like terms)
$x^2 = 20$ (divided both sides by 5)
$x = 4.47$ (took the square root of both sides)
c. 15 and 16
d. $4^{5-3} = 4^2 = 16$
or
$\frac{4^5}{4^3} = 4^2 = 16$
e. 2.33000042×10^2
f. prime factors = 2 • 2 • 2 • 2 • 2 • 2 • 2 • 2 • 2 • 2 • 2
square root = 2 • 2 • 2 • 2 • 2 = 32

Worksheet 17.7

1. a. $(5 \text{ ft})^2 + (10 \text{ ft})^2 = c^2$
$25 \text{ ft}^2 + 100 \text{ ft}^2 = c^2$
$125 \text{ ft}^2 = c^2$
$\sqrt{125 \text{ ft}^2} = \sqrt{c^2}$
$11.18 \text{ ft} = c$
b. $(6.5 \text{ ft})^2 + (3 \text{ ft})^2 = c^2$
$42.25 \text{ ft}^2 + 9 \text{ ft}^2 = c^2$
$51.25 \text{ ft}^2 = c^2$
$\sqrt{51.25 \text{ ft}^2} = \sqrt{c^2}$
$7.16 \text{ ft} = c$
c. no

2. a. $(4 \text{ ft})^2 + (6 \text{ ft})^2 = c^2$
$16 \text{ ft}^2 + 36 \text{ ft}^2 = c^2$
$52 \text{ ft}^2 = c^2$
$\sqrt{52 \text{ ft}^2} = \sqrt{c^2}$
$7.21 \text{ ft} = c$
b. $(10.5 \text{ in})^2 + b^2 = (20.5 \text{ in})^2$
$110.25 \text{ in}^2 + b^2 = 420.25 \text{ in}^2$
$b^2 = 310 \text{ in}^2$ (added -110.25 in^2 to both sides)
$\sqrt{b^2} = \sqrt{310 \text{ in}^2}$
$b = 17.61$ in
c. No; we do not know if the triangle is a right triangle.

3. a. 2.6147×10^{-8}
b. $8x^2 = 1{,}024$ (combined like terms)
$x^2 = 128$ (divided both sides by 8)
$x = 11.31$ (took the square root of both sides)
c. *prime factors* = 2 • 2 • 2 • 2 • 5 • 5 • 5 • 5
square root = 2 • 2 • 5 • 5 = 100
d. 27 and 28
e. $v^{4+2} = v^6$

Worksheet 17.8

1. a. the number that, times itself 6 times equals 50
b. 50
c. 6
d. $\sqrt{}$

2. Check for both prime factors and cubed root.
a. *prime factors* = 2 • 2 • 2
cubed root = 2
b. *prime factors* = 2 • 2 • 2 • 2 • 2 • 2 • 2 • 2 • 2
cubed root = 2 • 2 • 2 = 8
Note: We found the cubed root by grouping the prime factors into the factor that, multiplied by itself 3 times, equals 512.
(2 • 2 • 2)(2 • 2 • 2)(2 • 2 • 2) = (8)(8)(8) = 512
c. *prime factors* = 2 • 2 • 2 • 3 • 3 • 3
cubed root = 2 • 3 = 6
Note: We found the cubed root by grouping the prime factors into the factor that, multiplied by itself 3 times, equals 216.
(2 • 3)(2 • 3)(2 • 3) = (6)(6)(6) = 512

3. a. $850 \text{ m}^2 = s^2$
$29.15 \text{ m} = s$ (took the square root of both sides)
b. $(29.15 \text{ m})^2 + (29.15 \text{ m})^2 = c^2$
$849.7225 \text{ m}^2 + 849.7225 \text{ m}^2 = c^2$
$\sqrt{1{,}699.445 \text{ m}^2} = \sqrt{c^2}$
41.22 m
c. $343 \text{ ft}^3 = s^3$
$7 \text{ ft} = s$ (took the cubed root of both sides)

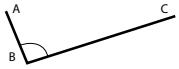
4. $(42\text{ in})^2 + (18.5\text{ in})^2 = c^2$
$1{,}764\text{ in}^2 + 342.25\text{ in}^2 = c^2$
$2{,}106.25\text{ in}^2 = c^2$
$\sqrt{2{,}106.25\text{ in}^2} = \sqrt{c^2}$
$45.89\text{ in} = c$

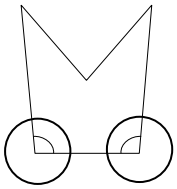
5. a. -4.42×10^{-5}
b. I need to know that the triangle is a right triangle.
c. $4x^{2+3} = 4x^5$
d. $\frac{4x^2}{x^3{}_1} = \frac{4}{x}$ *or* $4x^{-1}$
or
$4x^{2-3} = 4x^{-1}$ *or* $\frac{4}{x}$

6. a. $9x^3 + 6 = 1{,}131$ (combined like terms)
$9x^3 = 1{,}125$ (added –6 to both sides)
$x^3 = 125$ (divided both sides by 9)
$x = 5$ (took the cubed root of both sides)

Worksheet 18.1

Note: If students need a review of finding missing numbers in proportions, review Lessons 5.1 and 5.2.

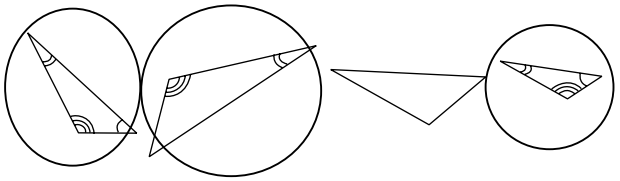
1. 

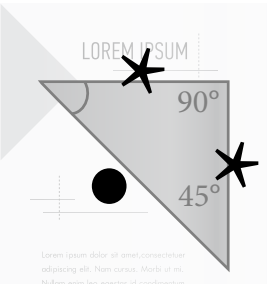



2. $\frac{2.5\text{ ft}}{8\text{ ft}} = \frac{x}{3\text{ in}}$; $x = 0.94$ in

3. We've used x to stand for the missing angle in these problems, but the student could have used any symbol.
a. $85° + 45° + x = 180°$
$130° + x = 180°$
$x = 50°$ (added –130° to both sides)
b. $75° + 30° + x = 180°$
$105° + x = 180°$
$x = 75°$ (added –105° to both sides)
c. $90° + 45° + x = 180°$
$135° + x = 180°$
$x = 45°$ (added –135° to both sides)

4. No; the definition of a triangle is different in spherical geometry.

5. a. two
b. 
c. We need to know that *one* more set of corresponding angles are congruent.
d. We know because of the AA similarity theorem.
(Two triangles have to be similar if two sets of their corresponding angles are congruent. The picture shows two sets of corresponding congruent angles — the right angles and the other marked angles.)
e. $\frac{x}{6.53\text{ ft}} = \frac{28.63\text{ in}}{7.48\text{ in}}$
$x = 25$ ft

6. a. The triangle in 3c. (It has a 90°, or right, angle.)
b. 

7. $(2\text{ in})^2 + (3\text{ in})^2 = c^2$
$4\text{ in}^2 + 9\text{ in}^2 = c^2$
$13\text{ in}^2 = c^2$
$\sqrt{13\text{ in}^2} = \sqrt{c^2}$
$3.61\text{ in} = c$

8. *prime factors* = 5 • 5 • 9 • 9
square root = 5 • 9 = 45

Worksheet 18.2

1. Check that tangents were found using the method shown.
a. tangent of 60° = $\frac{3.46\text{ in}}{2\text{ in}} = 1.73$
b. 1.73
(The dimensions don't matter — the ratio between the opposite and adjacent sides of any 60o angle in a right triangle will always be the same since all right triangles with a 60° angle are similar.)
c. tangent of 30° = $\frac{2\text{ in}}{3.46\text{ in}} = 0.58$

2. a. 5.67
b. 3.27
c. 0.70
d. 0.27

3. a. $1 = \frac{x}{4\text{ ft}}$
$4\text{ ft} = x$ (multiplied both sides by 4 ft)
b. $0.36 = \frac{\textit{opposite leg}}{\textit{adjacent leg}}$
$0.36 = \frac{\textit{opposite leg}}{4\text{ in}}$
$1.44\text{ in} = \textit{opposite leg}$ (multiplied both sides by 4 in)

4. a. tangent of 55° = $\frac{x}{20\text{ ft}}$
$1.428148007 = \frac{x}{20\text{ ft}}$ (found the tangent of 55° on a calculator)
$28.56\text{ ft} = x$ (multiplied both sides by 20 ft)
$29\text{ ft} = x$ (rounded per instructions)
b. *total height of house* = 29 ft + 6 ft = 35 ft

5. Yes; the triangles have two sets of corresponding congruent angles (the 90° angles and the 30° angles.)

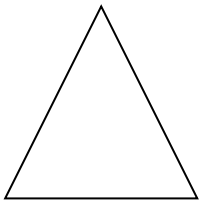
6. a. 25 and 26
b. $(50\text{ ft})^2 + b^2 = (78\text{ ft})^2$
$2{,}500\text{ ft}^2 + b^2 = 6{,}084\text{ ft}^2$
$b^2 = 3{,}584\text{ ft}^2$ (added $-2{,}500\text{ ft}^2$ to both sides)
$\sqrt{b^2} = \sqrt{3{,}5842}$
$b = 59.87$ ft
c. *prime factors* = 2 • 2 • 3 • 3 • 3 • 3 • 3 • 3
square root = 2 • 3 • 3 • 3 = 54

Reference Sheets

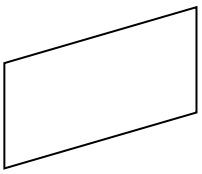
Please tear these pages out and place in your math notebook, along with blank paper on which to add your own notes.

Polygon

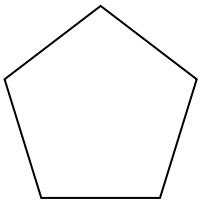
(closed, two-dimensional figure with straight lines)



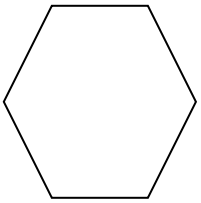
Triangle
(3 sides)



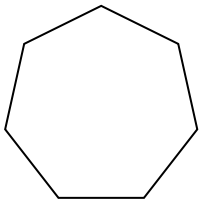
Quadrilateral
(4 sides)



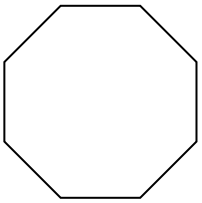
Pentagon
(5 sides)



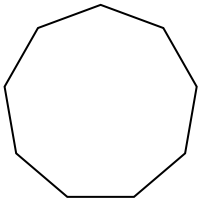
Hexagon
(6 sides)



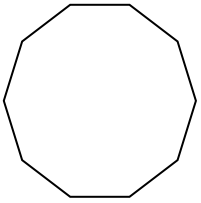
Heptagon
(7 sides)



Octagon
(8 sides)



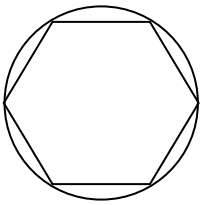
Nonagon
(9 sides)

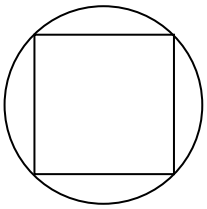


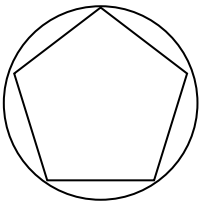
Decagon
(10 sides)

Regular Polygon

(All sides are equal; all edges would touch a circle drawn around the figure, as all angles are the same.)

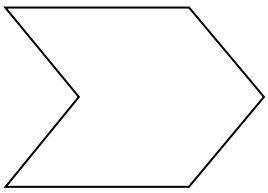


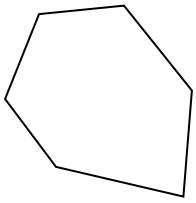


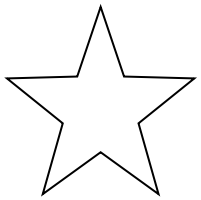


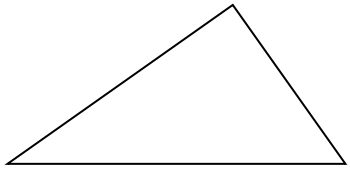
Irregular Polygon

(Polygons that are not regular.)







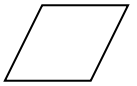


Specific Quadrilaterals

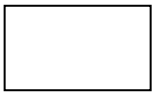
Trapezoid
(quadrilateral with 1 pair of parallel sides)

Some books define a trapezoid as a quadrilateral with 1, and only 1, pair of parallel sides, while others as a quadrilateral with 1 (or more) pair of parallel sides. Likewise, some define a rhombus/diamond differently than listed here. Always remember that definitions can — and do — vary!

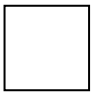
Parallelogram
(quadrilateral with both pairs of opposite sides parallel)



Rhombus/Diamond
(parallelogram with equal-length sides)

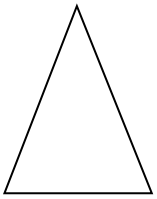


Rectangle
(parallelogram with right angles)

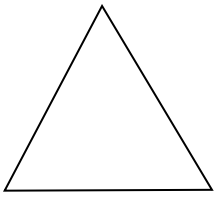


Square
(parallelogram with equal-length sides *and* right angles)

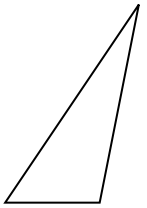
Triangles Categorized by Length of Sides



Isosceles
(two equal sides)

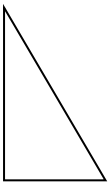


Equilateral
(all equal sides)

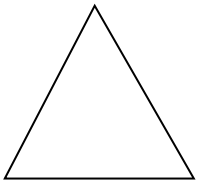


Scalene
(no equal sides)

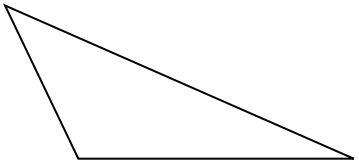
Triangles Categorized by Angles



Right Triangle
(a right angle)



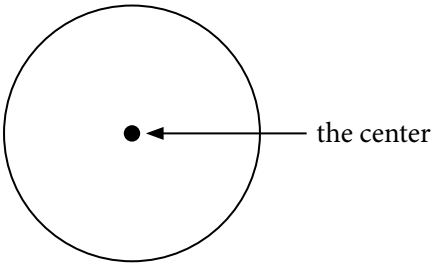
Acute Triangle
(all acute angles)



Obtuse Triangle
(an obtuse angle)

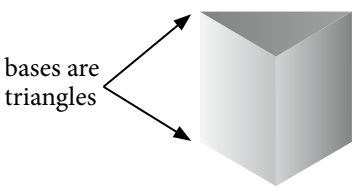
Circle

(closed two-dimensional figure; each part of the edge is equally distant from the center)

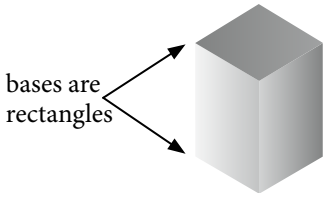


Prism

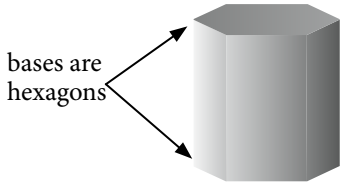
(A solid with two bases that are parallel polygons, and faces [sides] that are parallelograms; the prism is named after the shape of the bases.)



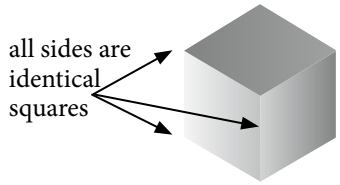
Triangular Prism



Rectangular Prism



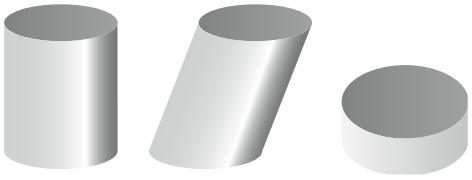
Hexagonal Prism



Cube

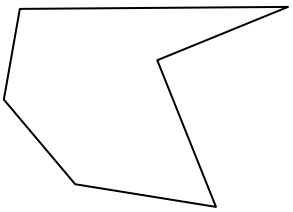
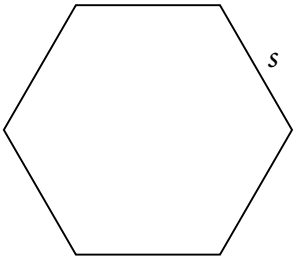
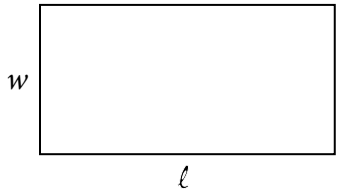
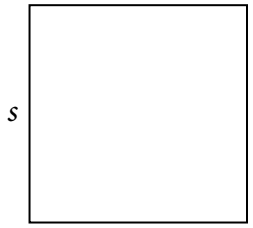
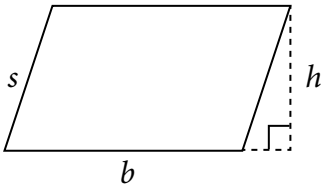
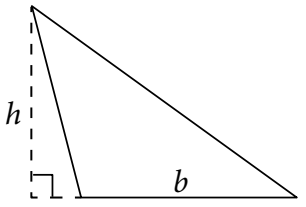
Cylinder

(A solid with two bases that are equal parallel circles, having an equal diameter in any parallel plane between them.)

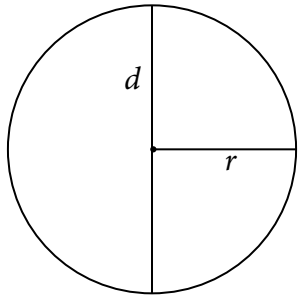


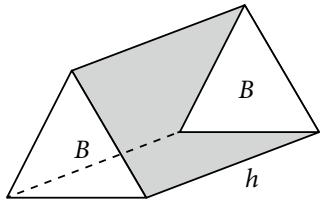
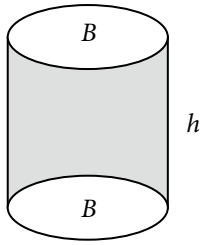
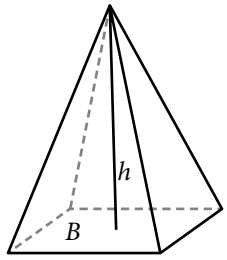
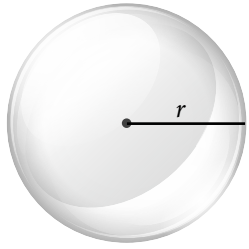
Prism and cylinder definitions were based on *Ray's New Higher Arithmetic*, Revised (Cincinnati: Van Antwerp, Bragg & Co., 1880), p. 390.

Formulas

Shape Name	Type of Shape	Perimeter	Area
Polygons		***P* = *sum of the lengths of each side*** *or* $P = s_1 + s_2 \ldots s_n$	View as multiple triangles or other shapes.
Regular Polygon		***P* = *(number of sides)* • *(length of a side)*** *or* $P = n \cdot s$ *or* $P = n(s)$ *or* $P = ns$	View as multiple triangles or other shapes.
Rectangle		$P = (2 \cdot length) + (2 \cdot width)$ *or* $P = 2 \cdot \ell + 2 \cdot w$ *or* $P = 2(\ell) + 2(w)$ *or* $P = 2\ell + 2w$	$A = length \cdot width$ *or* $A = \ell \cdot w$ *or* $A = \ell(w)$ *or* $A = \ell w$
Square		$P = 4 \cdot side$ *or* $P = 4 \cdot s$ *or* $P = 4(s)$ *or* $P = 4s$	$A = side \cdot side$ *or* $A = s \cdot s$ *or* $A = s(s)$ *or* $A = s^2$
Parallelogram		$P = (2 \cdot base) + (2 \cdot side)$ *or* $P = 2 \cdot b + 2 \cdot s$ *or* $P = 2(b) + 2(s)$ *or* $P = 2b + 2s$	$A = base \cdot height$ *or* $A = b \cdot h$ *or* $A = b(h)$ *or* $A = bh$
Triangle		***Perimeter* = *sum of the lengths of each side*** *or* $P = s_1 + s_2 + s_3$	$A = \frac{1}{2} \cdot base \cdot height$ *or* $A = \frac{base \cdot height}{2}$ $A = \frac{1}{2} \cdot b \cdot h$ *or* $A = \frac{1}{2}bh$ *or* $A = \frac{b \cdot h}{2}$ *or* $A = \frac{bh}{2}$

A = Area
B = area of the base
b = base
C = circumference
d = diameter
h = height
ℓ = length
n = number of sides
P = Perimeter
π = 3.14
r = radius
s = side
V = Volume
w = width (or height)

Shape Name	Type of Shape	Circumference	Area
Circle		***Circumference = π • diameter*** *or* $C = \pi \cdot d$ *or* $C = \pi(d)$ *or* $C = \pi d$ ***Circumference = 2 • π • radius*** *or* $C = 2 \cdot \pi \cdot r$ *or* $C = 2(\pi)(r)$ *or* $C = 2\pi r$	***Area = π • radius • radius*** *or* $A = \pi \cdot r^2$ *or* $A = \pi(r^2)$ *or* $A = \pi r^2$
		diameter = 2 • radius *or* $d = 2 \cdot r$ *or* $d = 2r$ ***radius*** $= \frac{1}{2} \cdot$ ***diameter*** *or* $r = \frac{1}{2} \cdot d$ *or* $r = \frac{1}{2} d$	

Shape Name	Type of Shape	Volume	Area
Prism		***Volume = area of base • height*** *or* $V = B \cdot h$ *or* $V = Bh$	***Total surface area = area of all the sides (i.e., surfaces) of a solid object***
Cylinder		***Volume = area of base • height*** *or* $V = B \cdot h$ *or* $V = Bh$	did not cover
Pyramid		***Volume*** $= \frac{1}{3} \cdot$ ***area of base • height*** *or* $V = \frac{1}{3} \cdot B \cdot h$ *or* $V = \frac{1}{3} Bh$	did not cover
Sphere		***Volume*** $= \frac{4}{3} \cdot \pi \cdot$ ***radius***^{3} ***or*** $V = \frac{4}{3} \cdot \pi \cdot r^3$ ***or*** $V = \frac{4}{3} \pi r^3$	did not cover

A = Area
B = area of the base
b = base
C = circumference
d = diameter
h = height
ℓ = length
n = number of sides
P = Perimeter
π = 3.14
r = radius
s = side
V = Volume
w = width (or height)

Units of Measure

Distance

Distance – U.S. Customary

12 inches (in) = 1 foot (ft)
3 feet / 36 inches = 1 yard (yd)
1,760 yard / 5,280 feet = 1 mile (mi)

Conversion Between Systems

1 inches (in) = 2.54 centimeter (cm)
1 foot (ft) = 30.48 centimeter (cm)
1 yard (yd) = 0.9144 meter (m)
1 mile (mi) = 1.609344 kilometer (km)

Distance – Metric/SI

10 millimeters (mm) = 1 centimeter (cm)
10 centimeters = 1 decimeter (dm)
10 decimeters / 100 centimeters / 1,000 millimeters = 1 meter (m)
10 meters = 1 decameters (dam)
10 decameters = 1 hectometer (hm)
10 hectometers / 1,000 meters = 1 kilometer (km)

Time

60 seconds (s) = 1 minute (min)
60 minutes = 1 hour (hr)
24 hours = 1 day (d)
7 days = 1 week (wk)
365 days = 1 year (yr *or* y)

Liquid Capacity

U.S. Customary

3 teaspoons (tsp) = 1 tablespoon (Tbsp)
16 tablespoons = 1 cup (c)
2 cups = 1 pint (pt)
2 pints = 1 quart (qt)
4 quarts = 1 gallon (gal)

2 tablespoons (Tbsp) ≈ 1 fluid ounce (fl oz)
8 fl oz = 1 cup (c)
16 fl oz = 1 pint (pt)
32 fl oz = 1 quart (qt)
128 fl oz = 1 gallon (gal)

Conversion Between Systems

1 teaspoon ≈ 5 milliliters
1 gallon = 3.78541 liters

1 pint = 28.875 in^3
1 quart = 57.75 in^3
1 gallon = 231 in^3

Metric

10 milliliters (ml *or* mL) = 1 centiliter (cl *or* cL)
10 centiliter / 100 milliliter = 1 deciliter (dl *or* dL)
10 deciliter / 100 centiliter / 1,000 milliliter = 1 liter (*l or* L)
10 liters = 1 dekaliter (dal *or* daL)
10 dekaliter = 1 hectoliter (hl *or* hL)
10 hectoliter / 1,000 liters = 1 kiloliter (kl *or* kL)

Dry Capacity

U.S. Customary

2 pints (pt) = 1 quart (qt)
8 quart = 1 peck (pk)
4 peck = 1 bushel (bu) / 32 quarts (qt)

Conversion Between Systems

1 quart = 67.2006 $inches^3$
1 bushel = 2,150.42 $inches^3$

Note: The pint and quart here represent a larger capacity than the ones measuring liquid—they should not be used interchangeably. Unless the problem specifically states otherwise, you can assume pint and quart in this course refer to the liquid units.

Mass

U.S. Customary

16 ounces (oz) = 1 pound (lb)
2,000 pounds = 1 ton (called a "short ton")

Conversion Between Systems

1 ounce = 28.3495 grams
1 pound = 453.592 grams
1 U.S. ton (called a short ton) = 0.907185 metric tons

Note: These ounces are different than the fluid ounces listed under liquid capacity.

Metric

10 milligrams (mg) = 1 centigram (cg)
10 centigrams / 100 milligrams = 1 decigram (dg)
10 decigrams / 100 centigrams / 1,000 milligrams = 1 gram (g)
10 grams = 1 dekagram (dag)
10 dekagrams = 1 hectogram (hg)
10 hectograms / 1,000 grams = 1 kilogram (kg)

For more unit details, see 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.

Important Mathematical Relationships

Distance Problems *See Lessons 3.5, 3.7, and 5.3.*

$$d = s \cdot t \text{ or } d = st$$
$$\textit{distance} = \textit{speed} \cdot \textit{time}$$

Altitude (or Height) Problems *See Lesson 3.7.*

$$a = r \cdot t + a_i$$
$$\textit{altitude (or height)} = \textit{rate of change in altitude (or height)} \cdot \textit{time} + \textit{initial altitude (or height)}$$

Percent Problems *See Lesson 6.3.*

$$R \cdot B = P \text{ or } RB = P$$
$$\textit{Rate} \cdot \textit{Base} = \textit{Percentage}$$

Think: The rate *of* the base *equals* the percentage.

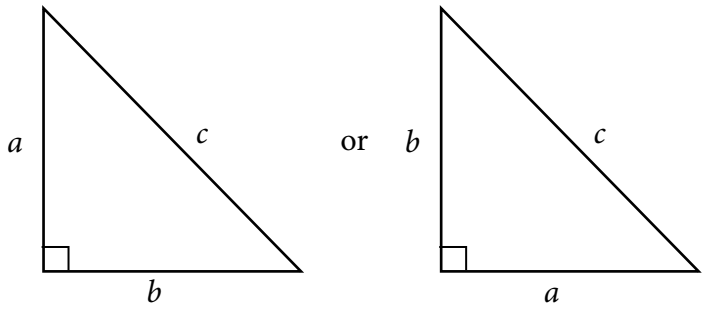
Probability *See Chapter 12.*

$$\textit{probability of an event} = \frac{\textit{outcomes that produce event}}{\textit{total possible outcomes}}$$

$$\textit{odds for} = \frac{\textit{outcomes that produce event}}{\textit{outcomes that do not produce event}}$$

$$\textit{odds against} = \frac{\textit{outcomes that do not produce event}}{\textit{outcomes that produce event}}$$

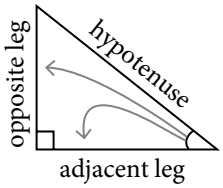
Pythagorean Theorem *See Lessons 17.5–17.7.*

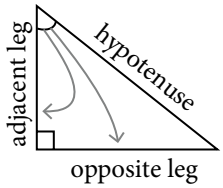


$a^2 + b^2 = c^2$
where c stands for the length of the hypotenuse of a right triangle, and a and b stand for the length of the two legs of the same right triangle

Trigonometry *See Chapter 18.*

Tangent of an angle — The ratio between the opposite and adjacent leg of either non-right angle in a right triangle.





$$\textit{tangent of an angle} = \frac{\textit{opposite leg}}{\textit{adjacent leg}}$$

Sine of an angle — The ratio between the opposite leg of either non-right angle in a right triangle and the hypotenuse.

$$\textit{sine of an angle} = \frac{\textit{opposite leg}}{\textit{hypotenuse}}$$

Cosine of an angle — The ratio between the adjacent leg of either non-right angle in a right triangle and the hypotenuse.

$$\textit{cosine of an angle} = \frac{\textit{adjacent leg}}{\textit{hypotenuse}}$$

Exponential Growth and Decay (Applies to Compound Interest Too) *See Lessons 15.5–15.7 and Lessons 20.1–20.2.*

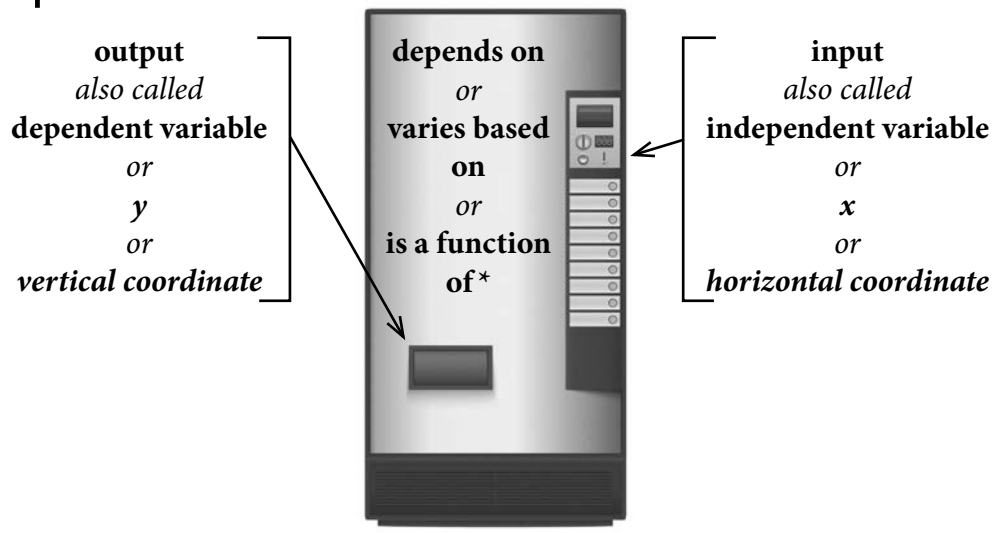
$$P = P_0(1 + r)^t$$

where

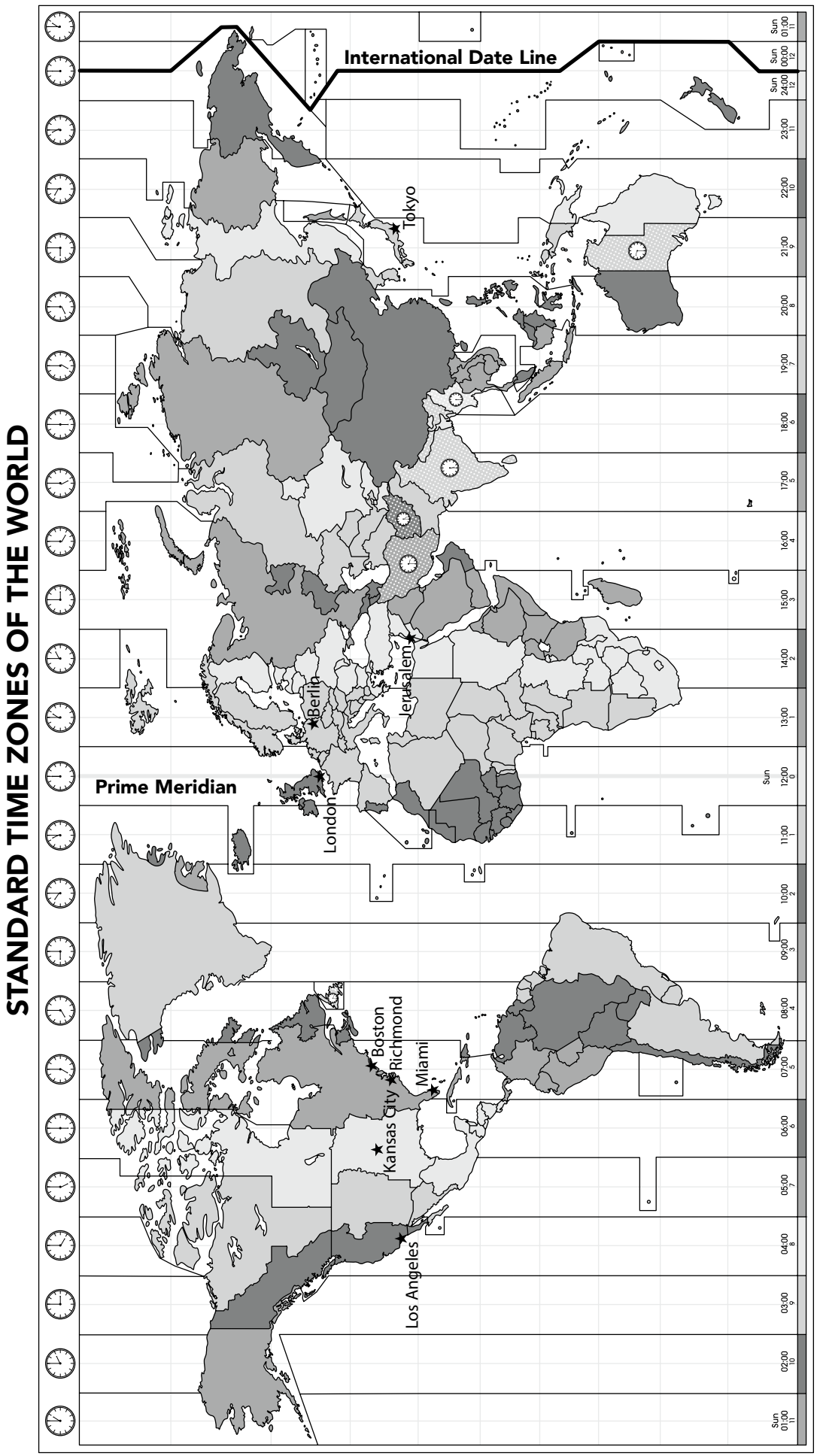
P = final amount after growth or decay
P_0 = initial amount before growth or decay
r = rate of growth or decay over a specified period of time
t = the number of specified periods of time that have passed

Mathematical Relationships See Lesson 13.2–13.5 and 14.1 for an explanation.

Important Terms



*The term *is a function of* is only used if we know there's only one output for every input.


STANDARD TIME ZONES OF THE WORLD
International Date Line
Prime Meridian
Tokyo
Berlin
Jerusalem
London
Boston
Richmond
Miami
Kansas City
Los Angeles