
Contents

Introduction	4
Introduction to Ratios	6
Ratios and Fractions	10
Ratios	13
Solving Problems Using Equivalent Ratios	16
Ratios in Rectangles	18
Solving Proportions 1: Equivalent Rates	20
Solving Proportions 2: Cross Multiplying	22
Why Cross Multiplying Works	25
Solving Proportions 3: Practice	26
Scaling Figure 1	30
Scaling Figures 2	33
Floor Plans	35
Problem Solving with Diagrams, Part 1	
Finding a Fractional Part of the Whole	37
Problem Solving 2	39
Problem Solving 3	41
Problem Solving 4	43
Ratio Problems and Bar/Block Models 1	45
Ratio Problems and Bar/Block Models 2	47
Review	51
Answers	55
More from Math Mammoth	72

Introduction

Math Mammoth Ratios & Proportions & Problem Solving is a worktext that concentrates, first of all, on two important concepts: ratios and proportions, and then on problem solving.

My aim is to provide students with a thorough understanding of ratios and proportions, not only because that is the norm for 6th grade, but also because they are used so much in everyday-life applications, and because they are a natural extension to go to after the student understands the basics of fractions.

First, we study thoroughly the concept of ratio, including how it connects with fractions. Next, we turn our focus on equivalent ratios because those will lead us into proportions just a few lessons later. The lesson *Ratios in Rectangles* has applications about the aspect ratio.

Solving proportions is divided into three separate lessons. In the first one, we solve proportions by thinking through equivalent ratios. In the second one, the usual method of cross-multiplying is introduced. Then follows a lesson that explains just why cross-multiplying is allowed. Then there is more practice with solving proportions and word problems. We also study scaling geometric figures and floor plans, which are simple applications of proportions.

After this, the last lessons concentrate on various kinds of word problems that can be solved with the help of bar or block diagrams. These involve problems with fractional parts, and then problems involving ratios. The diagrams become a powerful tool to solve such problems without the use of algebra.

I wish you success in math teaching!

Maria Miller, the author

Helpful Resources on the Internet

Use these free online resources to supplement the “bookwork” as you see fit.

You can access an up-to-date online version of this list at

www.mathmammoth.com/weblinks/ratios_proportions_problem_solving.htm

Practice with Ratios

An online quiz from Regents Exam Prep Center

<http://www.regentsprep.org/Regents/math/ALGEBRA/AO3/pracRatio.htm>

Practice with Proportions

An online quiz from Regents Exam Prep Center

<http://www.regentsprep.org/Regents/math/ALGEBRA/AO3/pracProp.htm>

Ratio Stadium

A multi-player online racing game for matching equivalent ratios. The student with the fastest rate of correct answers will win the race.

<http://www.arcademicskillbuilders.com/games/ratio-stadium/>

Dirt Bike Proportions

A racing game where you need to find the unknown in a simple proportion. This game would actually work equally well for practicing equivalent fractions, because the proportions are quite simple.

<http://www.arcademicskillbuilders.com/games/dirt-bike-proportions/dirt-bike-proportions.html>

Challenge Board

Choose questions from the challenge board about rates, ratios, and proportions.

<http://www.quia.com/cb/158527.html>

Ratio and Proportion Game From BBC Skillswise

Write the simplified ratio of red to black marbles. Answer simple questions about ratios and marbles.

<http://www.bbc.co.uk/skillswise/numbers/wholenumbers/ratioandproportion/ratio/game.shtml>

Ratio Pairs Matching Game

Match cards representing equivalent ratios.

Easy: <http://nrich.maths.org/4824> Challenge: <http://nrich.maths.org/4821>

Equivalent Ratios Workout

10 online practice problems.

<http://www.math.com/school/subject1/practice/S1U2L1/S1U2L1Pract.html>

All About Ratios - Quizzes

Online quizzes about same and different ratios.

<http://math.rice.edu/~lanius/proportions/index.html>

Free Ride

An interactive activity about bicycle gear ratios. Choose the front and back gears, which determines the gear ratio. Then choose a route, pedal forward, and make sure you land exactly on the five flags.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=178>

Thinking Blocks

An interactive math tool developed to help students learn how to solve multistep word problems. Using brightly colored blocks, students model the relationships among the components of each word problem. The website has addition/subtraction problems, multiplication/division problems, and ratio problems. This block model corresponds to the bar model used in this book.

<http://www.thinkingblocks.com/>