Contents

Introduction

In *Math Mammoth Rational Numbers* we study *rational* numbers, which are numbers that can be written as a *ratio* of two integers. All fractions and whole numbers are rational numbers, and so are percentages and decimals (except non-ending non-repeating decimals). Hopefully, students already know a lot about rational numbers and how to calculate with them. Our focus in this book is to extend that knowledge to negative fractions and negative decimals.

The first lesson, *Fractions and Decimals*, reviews methods of converting fractions to decimals and decimals to fractions.

Next, we present the definition of a rational number, how to convert rational numbers back and forth between their fractional and decimal forms, and a bit about repeating decimals (most fractions become repeating decimals when written as decimals). The next lesson deals with adding and subtracting rational numbers, with an emphasis on adding and subtracting negative fractions and decimals.

The next two lessons are about multiplying and dividing rational numbers. The first of the two focuses on basic multiplication and division with negative fractions and decimals. The second of the two compares multiplying and dividing in decimal notation to multiplying and dividing in fraction notation. Students come to realize that, though the calculations — and even the answers — may look very different, the answers are equal. The lesson also presents problems that mix decimals, fractions, and percentages, and deals with real-life contexts for the problems and the importance of pre-estimating what a reasonable answer would be.

The lesson *Multiple Operations with Rational Numbers* reviews the order of operations and applies it to fraction and decimal problems with more than one operation. It also presents a simple method to solve complex fractions, which are fractions that contain another fraction, either in the numerator, in the denominator, or in both.

After a lesson on scientific notation, the instructional portion of the book concludes with two lessons on solving simple equations that involve fractions and decimals.

I wish you success in teaching math!

Maria Miller, the author

Helpful Resources on the Internet

Rational numbers

Practice with Irrational and Rational Numbers
Two pages of exercises where you need to tell whether numbers are rational or irrational. Includes a self-check answer key.
http://www.regentsprep.org/Regents/math/ALGEBRA/AOP1/PRatNos.htm
http://www.regentsprep.org/Regents/math/ALGEBRA/AOP1/Prat.htm

Rational and Irrational Numbers Game
Drag each number into the correct bin to classify them as rational or irrational. Fast-paced.
http://www.math-play.com/rational-and-irrational-numbers-game/rational-and-irrational-numbers-game.html

Classifying Numbers
Drag the given numbers to the correct sets. This chapter of Math Mammoth does not teach about square roots and irrational numbers but you can probably do these activities, if you note that most square roots are irrational, and that the set of whole numbers is {0, 1, 2, 3, 4, ...}.
http://www.softschools.com/math/classifying_numbers/

http://www.softschools.com/math/classifying_numbers/real_rational_integer_whole_natural_irrational_number_table/

Number System Muncher
"Munch" or select all the numbers from the grid that are in the specified set. Again, this chapter of Math Mammoth does not teach about square roots and irrational numbers but you can probably play the game, if you note the following: Taking a square root is the opposite operation of squaring. For example, $\sqrt{25} = 5$ because $5^2 = 25$. Therefore, $\sqrt{25}$ is actually a natural number (5). However, most square roots, such as $\sqrt{5}$ and $\sqrt{13}$ are irrational.
http://staff.argyll.epsb.ca/jreed/math9/strand1/munchers.htm

Recurring Decimals and Fractions
Two games (Grade or No Grade and Fling the Teacher) where you answer multiple-choice questions about repeating decimals.
https://sites.google.com/a/revisemaths.org.uk/revise/number-files/recdecfrac-gong.swf?attredirects=0
https://sites.google.com/a/revisemaths.org.uk/revise/number-files/recdecfrac-fling.swf?attredirects=0

Terminating and Repeating Decimal Numbers Practice
Tell whether whether the quotient of the following problems are terminating decimal numbers or repeating decimal numbers.
http://www.studyzone.org/mtestprep/math8/e/reptermdecimals6p.cfm

Terminating vs. Repeating Decimals Game
A card game that practices repeating and terminating decimals. Students create fractions from their cards and then turn them into decimals to see if they are terminating or repeating. Several fun twists to score extra points! This game costs $1 (per download).
http://www.teacherspayteachers.com/Product/Terminating-VS-Repeating-Decimals-Game-425199

Terminating and Repeating Decimals Worksheet
A 10-question online quiz about repeating decimals.
http://worksheets.tutorvista.com/terminating-and-repeating-decimals-worksheet.html

Converting Repeating Decimals to Fractions
A lesson that explains the method for writing repeating decimals as fractions.
http://www.basic-mathematics.com/converting-repeating-decimals-to-fractions.html

The four operations with rational numbers

Power Football
Practice the four operations with decimals with a football game. Choose "all of the above" (all operations), level "medium" or "hard," and "algebra style" to practice the concepts studied in this chapter.
http://www.funbrain.com/football/

Adding and Subtracting Rational Numbers Test
A 15-question test with mostly multiple-choice questions about adding, subtracting, and comparing rational numbers.
http://teachers.henrico.k12.va.us/math/hcpsalgebra1/Documents/examviewweb/ev2-2.htm

Adding and Subtracting Rational Numbers Worksheets
Generate a worksheet for adding and subtracting negative fractions and decimals.
http://www.math-aids.com/Algebra/Algebra_1/Basics/Add_Sub_Rational.html

Add and Subtract Fractions Quiz
A multiple-choice quiz of five questions about adding and subtracting negative fractions and solving simple equations. Refresh the page to get a different set of questions.
http://www.phschool.com/webcodes10/index.cfm?fuseaction=home.gotoWebCode&wcprefix=asa&wcsuffix=0204

Multiply and Divide Fractions Quizzes
A multiple-choice quiz of five questions. Refresh the page to get a different set of questions.
http://www.phschool.com/webcodes10/index.cfm?fuseaction=home.gotoWebCode&wcprefix=asa&wcsuffix=0205

http://www.glencoe.com/sec/math/studytools/cgi-bin/msgQuiz.php4?isbn=0-07-829635-8&chapter=2&lesson=4

Multiply and Divide Rational Numbers Quiz
A multiple-choice quiz of five questions.
http://www.softschools.com/quizzes/math/multiply_rational_numbers/quiz3285.html

Scientific notation

Scientific Notation
Interactive practice where you write the given number in scientific notation.
http://www.xpmath.com/forums/arcade.php?do=play&gameid=21

Scientific Notation Quiz
Write numbers in scientific notation, and vice versa. You can modify the quiz parameters to your liking, such as changing the difficulty level or the duration of the quiz.
http://www.thatquiz.org/tq-c/?-j820-l6-p0

Scientific Notation Quizzes
Short, multiple-choice quizzes on scientific notation.
http://www.glencoe.com/sec/math/studytools/cgi-bin/msgQuiz.php4?isbn=0-02-833051-X&chapter=2&lesson=9

http://www.studyzone.org/mtestprep/math8/g/scientificnotationquiz.cfm

General

Equations Quiz
A five-question quiz on solving simple one-step equations that involve decimals. Refresh the page to get a different set of questions.
http://www.phschool.com/webcodes10/index.cfm?fuseaction=home.gotoWebCode&wcprefix=ara&wcsuffix=0404

Fraction Four
Choose "algebra" as the question type to solve equations that involve fractions in this connect-the-four game.
http://www.shodor.org/interactivate/activities/FractionFour/

Equations with Fractions Quiz
http://www.phschool.com/webcodes10/index.cfm?fuseaction=home.gotoWebCode&wcprefix=bja&wcsuffix=0508

7th Grade Numbers and Operations Jeopardy
A jeopardy game with questions about absolute value, ordering rational numbers, adding and subtracting rational numbers, and multiplying & dividing rational numbers.
http://www.math-play.com/7th-Grade-Numbers-and-Operations-Jeopardy/7th-Grade-Numbers-and-Operations-Jeopardy.html