# GRE Mathematics Prep 2019

## A Comprehensive Review and Ultimate Guide to the GRE Math Test

**2** Full-Length GRE Math Practice Exams

**2,500 +** Math problems with answers

A comprehensive review of everything on GRE Math

*Reza Nazari & Ava Ross*

# www.EffortlessMath.com

… So Much More Online!

✓ FREE Math lessons

✓ More Math learning books!

✓ Mathematics Worksheets

✓ Online Math Tutors

**Need a PDF version of this book?**

Visit www.EffortlessMath.com

# GRE Mathematics Prep 2019

## *A Comprehensive Review and Ultimate Guide to the GRE Math Test*

**By**

Reza Nazari & Ava Ross

Copyright © 2018

Reza Nazari & Ava Ross

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning, or otherwise, except as permitted under Section 107 or 108 of the 1976 United States Copyright Ac, without permission of the author.

All inquiries should be addressed to:

info@effortlessMath.com

www.EffortlessMath.com

**ISBN-13:** 978-1-970036-12-1

**ISBN-10:** 1-970036-12-5

**Published by: Effortless Math Education**

**www.EffortlessMath.com**

## Description

**GRE Mathematics Prep 2019** provides students with the confidence and math skills they need to succeed on the GRE Math, building a solid foundation of basic Math topics with abundant exercises for each topic. It is designed to address the needs of GRE test takers who must have a working knowledge of basic Math.

***This comprehensive book*** with over 2,500 sample questions and 2 complete GRE tests is all you need to fully prepare for the GRE Math. It will help you learn everything you need to ace the math section of the GRE.

Effortless Math unique study program provides you with an in-depth focus on the math portion of the exam, helping you master the math skills that students find the most troublesome.
This book contains most common sample questions that are most likely to appear in the mathematics section of the GRE.

Inside the pages of this comprehensive GRE Math book, students can learn basic math operations in a structured manner with a complete study program to help them understand essential math skills. It also has many exciting features, including:

- Dynamic design and easy-to-follow activities
- A fun, interactive and concrete learning process
- Targeted, skill-building practices
- Fun exercises that build confidence
- Math topics are grouped by category, so you can focus on the topics you struggle on
- All solutions for the exercises are included, so you will always find the answers
- 2 Complete GRE Math Practice Tests that reflect the format and question types on GRE

**GRE Mathematics Prep 2019** is an incredibly useful tool for those who want to review all topics being covered on the GRE test. It efficiently and effectively reinforces learning outcomes through engaging questions and repeated practice, helping you to quickly master basic Math skills.

## About the Author

**Reza Nazari** is the author of more than 100 Math learning books including:
**– Math and Critical Thinking Challenges:** For the Middle and High School Student
**– GED Math in 30 Days**
**– ASVAB Math Workbook 2018 - 2019**
**– Effortless Math Education Workbooks**
**– and many more Mathematics books …**

Reza is also an experienced Math instructor and a test–prep expert who has been tutoring students since 2008. Reza is the founder of Effortless Math Education, a tutoring company that has helped many students raise their standardized test scores—and attend the colleges of their dreams. Reza provides an individualized custom learning plan and the personalized attention that makes a difference in how students view math.

You can contact Reza via email at:
reza@EffortlessMath.com

Find Reza's professional profile at:
goo.gl/zoC9rJ

# Contents

Chapter 1: Fundamentals and Building Blocks ..... 10

Simplifying Fractions ..... 11

Adding and Subtracting Fractions ..... 12

Multiplying and Dividing Fractions ..... 13

Adding Mixed Numbers ..... 14

Subtract Mixed Numbers ..... 15

Multiplying Mixed Numbers ..... 16

Dividing Mixed Numbers ..... 17

Comparing Decimals ..... 18

Rounding Decimals ..... 19

Adding and Subtracting Decimals ..... 20

Multiplying and Dividing Decimals ..... 21

Converting Between Fractions, Decimals and Mixed Numbers ..... 22

Factoring Numbers ..... 23

Greatest Common Factor ..... 24

Least Common Multiple ..... 25

Answers of Worksheets – Chapter 1 ..... 26

Chapter 2: Real Numbers and Integers ..... 31

Adding and Subtracting Integers ..... 32

Multiplying and Dividing Integers ..... 33

Ordering Integers and Numbers ..... 34

Arrange, Order, and Comparing Integers ..... 35

Order of Operations ..... 36

Mixed Integer Computations ..... 37

Integers and Absolute Value ..... 38

Answers of Worksheets – Chapter 2 ..... 39

Chapter 3: Proportions and Ratios ..... 42

Writing Ratios ..... 43

Simplifying Ratios ..... 44

Create a Proportion ..... 45

Similar Figures ..... 46
Simple Interest ..... 47
Ratio and Rates Word Problems ..... 48
Answers of Worksheets – Chapter 3 ..... 49
Chapter 4: Percent ..... 51
Percentage Calculations ..... 52
Converting Between Percent, Fractions, and Decimals ..... 53
Percent Problems ..... 54
Markup, Discount, and Tax ..... 55
Answers of Worksheets – Chapter 4 ..... 56
Chapter 5: Algebraic Expressions ..... 58
Expressions and Variables ..... 59
Simplifying Variable Expressions ..... 60
Simplifying Polynomial Expressions ..... 61
Translate Phrases into an Algebraic Statement ..... 62
The Distributive Property ..... 63
Evaluating One Variable ..... 64
Evaluating Two Variables ..... 65
Combining like Terms ..... 66
Answers of Worksheets – Chapter 5 ..... 67
Chapter 6: Equations ..... 69
One–Step Equations ..... 70
Two–Step Equations ..... 71
Multi–Step Equations ..... 72
Answers of Worksheets – Chapter 6 ..... 73
Chapter 7: Inequalities ..... 74
Graphing Single–Variable Inequalities ..... 75
One–Step Inequalities ..... 76
Two–Step Inequalities ..... 77
Multi–Step Inequalities ..... 78
Answers of Worksheets – Chapter 7 ..... 79
Chapter 8: Linear Functions ..... 81

Finding Slope ..... 82
Graphing Lines Using Slope–Intercept Form ..... 83
Graphing Lines Using Standard Form ..... 84
Writing Linear Equations ..... 85
Graphing Linear Inequalities ..... 86
Finding Midpoint ..... 87
Finding Distance of Two Points ..... 88
Answers of Worksheets – Chapter 8 ..... 89
Chapter 9: Polynomials ..... 93
Classifying Polynomials ..... 94
Writing Polynomials in Standard Form ..... 95
Simplifying Polynomials ..... 96
Adding and Subtracting Polynomials ..... 97
Multiplying Monomials ..... 98
Multiplying and Dividing Monomials ..... 99
Multiplying a Polynomial and a Monomial ..... 100
Multiplying Binomials ..... 101
Factoring Trinomials ..... 102
Operations with Polynomials ..... 103
Answers of Worksheets – Chapter 9 ..... 104
Chapter 10: Quadratic and System of Equations ..... 108
Solve a Quadratic Equation ..... 109
Solving Systems of Equations by Substitution ..... 110
Solving Systems of Equations by Elimination ..... 111
Systems of Equations Word Problems ..... 112
Answers of Worksheets – Chapter 10 ..... 113
Chapter 11: Quadratic Functions ..... 114
Graphing Quadratic Functions in Standard Form ..... 115
Graphing Quadratic Functions in Vertex Form ..... 116
Solving Quadratic Equations by Factoring ..... 117
Use the Quadratic Formula and the Discriminant ..... 118
Operations with Complex Numbers ..... 119

Solve Quadratic Inequalities ..... 120
Answers of Worksheets – Chapter 11 ..... 121
Chapter 12: Exponents and Radicals ..... 125
Multiplication Property of Exponents ..... 126
Division Property of Exponents ..... 127
Powers of Products and Quotients ..... 128
Zero and Negative Exponents ..... 129
Negative Exponents and Negative Bases ..... 130
Writing Scientific Notation ..... 131
Square Roots ..... 132
Answers of Worksheets – Chapter 12 ..... 133
Chapter 13: Statistics and Probability ..... 136
Mean, Median, Mode, and Range of the Given Data ..... 137
The Pie Graph or Circle Graph ..... 138
Probability of Simple Events ..... 139
Factorials ..... 140
Permutations ..... 141
Combination ..... 142
Answers of Worksheets – Chapter 13 ..... 143
Chapter 14: Geometry ..... 145
The Pythagorean Theorem ..... 146
Area of Triangles ..... 147
Perimeter of Polygons ..... 148
Area and Circumference of Circles ..... 149
Area of Squares, Rectangles, and Parallelograms ..... 150
Area of Trapezoids ..... 151
Answers of Worksheets – Chapter 14 ..... 152
Chapter 15: Solid Figures ..... 153
Volume of Cubes ..... 154
Volume of Rectangle Prisms ..... 155
Surface Area of Cubes ..... 156
Surface Area of a Rectangle Prism ..... 157

Volume of a Cylinder ..... 158
Surface Area of a Cylinder ..... 159
Answers of Worksheets – Chapter 15 ..... 160
Chapter 16: Functions Operations ..... 161
Function Notation ..... 162
Adding and Subtracting Functions ..... 163
Multiplying and Dividing Functions ..... 164
Composition of Functions ..... 165
Answers of Worksheets – Chapter 16 ..... 166
GRE Quantitative Reasoning Practice Tests ..... 168
GRE Quantitative Reasoning Practice Tests Answers and Explanations ..... 208

# Chapter 1: Fundamentals and Building Blocks

**Topics that you'll learn in this chapter:**

- ✓ Simplifying Fractions
- ✓ Adding and Subtracting Fractions
- ✓ Multiplying and Dividing Fractions
- ✓ Adding Mixed Numbers
- ✓ Subtract Mixed Numbers
- ✓ Multiplying Mixed Numbers
- ✓ Dividing Mixed Numbers
- ✓ Comparing Decimals
- ✓ Rounding Decimals
- ✓ Adding and Subtracting Decimals
- ✓ Multiplying and Dividing Decimals
- ✓ Converting Between Fractions, Decimals and Mixed Numbers
- ✓ Factoring Numbers
- ✓ Greatest Common Factor
- ✓ Least Common Multiple

*"A Man is like a fraction whose numerator is what he is and whose denominator is what he thinks of himself. The larger the denominator, the smaller the fraction." –Tolstoy*

## Simplifying Fractions

*Helpful Hints*

– Evenly divide both the top and bottom of the fraction by 2, 3, 5, 7, ... etc.
– Continue until you can't go any further.

**Example:**

$\frac{4}{12} = \frac{2}{6} = \frac{1}{3}$

***Simplify the fractions.***

1) $\frac{22}{36}$

2) $\frac{8}{10}$

3) $\frac{12}{18}$

4) $\frac{6}{8}$

5) $\frac{13}{39}$

6) $\frac{5}{20}$

7) $\frac{16}{36}$

8) $\frac{18}{36}$

9) $\frac{20}{50}$

10) $\frac{6}{54}$

11) $\frac{45}{81}$

12) $\frac{21}{28}$

13) $\frac{35}{56}$

14) $\frac{52}{64}$

15) $\frac{13}{65}$

16) $\frac{44}{77}$

17) $\frac{21}{42}$

18) $\frac{15}{36}$

19) $\frac{9}{24}$

20) $\frac{20}{80}$

21) $\frac{25}{45}$

## Adding and Subtracting Fractions

**Helpful Hints**

– For "like" fractions (fractions with the same denominator), add or subtract the numerators and write the answer over the common denominator.

– Find equivalent fractions with the same denominator before you can add or subtract fractions with different denominators.

– Adding and Subtracting with the same denominator:

$$\frac{a}{b}+\frac{c}{b}=\frac{a+c}{b}$$
$$\frac{a}{b}-\frac{c}{b}=\frac{a-c}{b}$$

– Adding and Subtracting fractions with different denominators:

$$\frac{a}{b}+\frac{c}{d}=\frac{ad+cb}{bd}$$
$$\frac{a}{b}-\frac{c}{d}=\frac{ad-cb}{bd}$$

### Add fractions.

1) $\frac{2}{3}+\frac{1}{2}$

2) $\frac{3}{5}+\frac{1}{3}$

3) $\frac{5}{6}+\frac{1}{2}$

4) $\frac{7}{4}+\frac{5}{9}$

5) $\frac{2}{5}+\frac{1}{5}$

6) $\frac{3}{7}+\frac{1}{2}$

7) $\frac{3}{4}+\frac{2}{5}$

8) $\frac{2}{3}+\frac{1}{5}$

9) $\frac{16}{25}+\frac{3}{5}$

### Subtract fractions.

10) $\frac{4}{5}-\frac{2}{5}$

11) $\frac{3}{5}-\frac{2}{7}$

12) $\frac{1}{2}-\frac{1}{3}$

13) $\frac{8}{9}-\frac{3}{5}$

14) $\frac{3}{7}-\frac{3}{14}$

15) $\frac{4}{15}-\frac{1}{10}$

16) $\frac{3}{4}-\frac{13}{18}$

17) $\frac{5}{8}-\frac{2}{5}$

18) $\frac{1}{2}-\frac{1}{9}$

# Multiplying and Dividing Fractions

*Helpful Hints*

– **Multiplying fractions:** multiply the top numbers and multiply the bottom numbers.

– **Dividing fractions:** Keep, Change, Flip

Keep first fraction, change division sign to multiplication, and flip the numerator and denominator of the second fraction. Then, solve!

**Example:**

$$\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times \mathrm{d}}$$

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$$

## Multiplying fractions. Then simplify.

1) $\frac{1}{5} \times \frac{2}{3}$

2) $\frac{3}{4} \times \frac{2}{3}$

3) $\frac{2}{5} \times \frac{3}{7}$

4) $\frac{3}{8} \times \frac{1}{3}$

5) $\frac{3}{5} \times \frac{2}{5}$

6) $\frac{7}{9} \times \frac{1}{3}$

7) $\frac{2}{3} \times \frac{3}{8}$

8) $\frac{1}{4} \times \frac{1}{3}$

9) $\frac{5}{7} \times \frac{7}{12}$

## Dividing fractions.

10) $\frac{2}{9} \div \frac{1}{4}$

11) $\frac{1}{2} \div \frac{1}{3}$

12) $\frac{6}{11} \div \frac{3}{4}$

13) $\frac{11}{14} \div \frac{1}{10}$

14) $\frac{3}{5} \div \frac{5}{9}$

15) $\frac{1}{2} \div \frac{1}{2}$

16) $\frac{3}{5} \div \frac{1}{5}$

17) $\frac{12}{21} \div \frac{3}{7}$

18) $\frac{5}{14} \div \frac{9}{10}$

## Adding Mixed Numbers

*Helpful Hints*

Use the following steps for both adding and subtracting mixed numbers.

– Find the Least Common Denominator (LCD)
– Find the equivalent fractions for each mixed number.
– Add fractions after finding common denominator.
– Write your answer in lowest terms.

**Example:**

$1\frac{3}{4} + 2\frac{3}{8} = 4\frac{1}{8}$

***Add.***

1) $4\frac{1}{2} + 5\frac{1}{2}$

2) $2\frac{3}{8} + 3\frac{1}{8}$

3) $6\frac{1}{5} + 3\frac{2}{5}$

4) $1\frac{1}{3} + 2\frac{2}{3}$

5) $5\frac{1}{6} + 5\frac{1}{2}$

6) $3\frac{1}{3} + 1\frac{1}{3}$

7) $1\frac{10}{11} + 1\frac{1}{3}$

8) $2\frac{3}{6} + 1\frac{1}{2}$

9) $5\frac{3}{5} + 5\frac{1}{5}$

10) $7 + \frac{1}{5}$

11) $1\frac{5}{7} + \frac{1}{3}$

12) $2\ \frac{1}{4} + 1\frac{1}{2}$

## Subtract Mixed Numbers

*Helpful Hints*

Use the following steps for both adding and subtracting mixed numbers.

Find the Least Common Denominator (LCD)
– Find the equivalent fractions for each mixed number.
– Add or subtract fractions after finding common denominator.
– Write your answer in lowest terms.

**Example:**

$5\frac{2}{3} - 3\frac{2}{7} = 2\frac{8}{21}$

***Subtract.***

1) $4\frac{1}{2} - 3\frac{1}{2}$

2) $3\frac{3}{8} - 3\frac{1}{8}$

3) $6\frac{3}{5} - 5\frac{1}{5}$

4) $2\frac{1}{3} - 1\frac{2}{3}$

5) $6\frac{1}{6} - 5\frac{1}{2}$

6) $3\frac{1}{3} - 1\frac{1}{3}$

7) $2\frac{10}{11} - 1\frac{1}{3}$

8) $2\frac{1}{2} - 1\frac{1}{2}$

9) $6\frac{3}{5} - 2\frac{1}{5}$

10) $7\frac{2}{5} - 1\frac{1}{5}$

11) $2\frac{5}{7} - 1\frac{1}{3}$

12) $2\frac{1}{4} - 1\frac{1}{2}$

# Multiplying Mixed Numbers

## Helpful Hints

1- Convert the mixed numbers to improper fractions.
2- Multiply fractions and simplify if necessary.

$$a\frac{c}{b} = a + \frac{c}{b} = \frac{ab+c}{b}$$

**Example:**

$$2\frac{1}{3} \times 5\frac{3}{7} =$$

$$\frac{7}{3} \times \frac{38}{7} = \frac{38}{3} = 12\frac{2}{3}$$

***Find each product.***

1) $1\frac{2}{3} \times 1\frac{1}{4}$

2) $1\frac{3}{5} \times 1\frac{2}{3}$

3) $1\frac{2}{3} \times 3\frac{2}{7}$

4) $4\frac{1}{8} \times 1\frac{2}{5}$

5) $2\frac{2}{5} \times 3\frac{1}{5}$

6) $1\frac{1}{3} \times 1\frac{2}{3}$

7) $1\frac{5}{8} \times 2\frac{1}{2}$

8) $3\frac{2}{5} \times 2\frac{1}{5}$

9) $2\frac{2}{3} \times 4\frac{1}{4}$

10) $2\frac{3}{5} \times 1\frac{2}{4}$

11) $1\frac{1}{3} \times 1\frac{1}{4}$

12) $3\frac{2}{5} \times 1\frac{1}{5}$

## Dividing Mixed Numbers

*Helpful Hints*

1- Convert the mixed numbers to improper fractions.
2- Divide fractions and simplify if necessary.

$$a\frac{c}{b} = a + \frac{c}{b} = \frac{ab+c}{b}$$

**Example:**

$10\frac{1}{2} \div 5\frac{3}{5} =$

$\frac{21}{2} \div \frac{28}{5} = \frac{21}{2} \times \frac{5}{28} = \frac{105}{56}$

$= 1\frac{7}{8}$

***Find each quotient.***

1) $2\frac{1}{5} \div 2\frac{1}{2}$

2) $2\frac{3}{5} \div 1\frac{1}{3}$

3) $3\frac{1}{6} \div 4\frac{2}{3}$

4) $1\frac{2}{3} \div 3\frac{1}{3}$

5) $4\frac{1}{8} \div 2\frac{2}{4}$

6) $3\frac{1}{2} \div 2\frac{3}{5}$

7) $3\frac{5}{9} \div 1\frac{2}{5}$

8) $2\frac{2}{7} \div 1\frac{1}{2}$

9) $3\frac{1}{5} \div 1\frac{1}{2}$

10) $4\frac{3}{5} \div 2\frac{1}{3}$

11) $6\frac{1}{6} \div 1\frac{2}{3}$

12) $2\frac{2}{3} \div 1\frac{1}{3}$