

# **Your Mathematics Standards Companion, Grades 6–8**

**What They Mean and  
How to Teach Them**

**Ruth Harbin Miles**

**Lois A. Williams**

Series Creator: Jim Burke

Mathematics Series Creator: Linda M. Gojak

**Name:** \_\_\_\_\_

**Department:** \_\_\_\_\_

**Learning Team:** \_\_\_\_\_

**A JOINT PUBLICATION**



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



FOR INFORMATION:

Corwin  
A SAGE Company  
2455 Teller Road  
Thousand Oaks, California 91320  
(800) 233-9936  
[www.corwin.com](http://www.corwin.com)

SAGE Publications Ltd.  
1 Oliver's Yard  
55 City Road  
London EC1Y 1SP  
United Kingdom

SAGE Publications India Pvt. Ltd.  
B 1/I 1 Mohan Cooperative Industrial Area  
Mathura Road, New Delhi 110 044  
India

SAGE Publications Asia-Pacific Pte. Ltd.  
3 Church Street  
#10-04 Samsung Hub  
Singapore 049483

---

Series Creator: Jim Burke  
Mathematics Series Creator: Linda M. Gojak  
State Standards Indexer: Tom Muchlinski  
Acquisitions Editor: Erin Null  
Editorial Development Manager: Julie Nemer  
Editorial Assistant: Nicole Shade  
Production Editor: Melanie Birdsall  
Copy Editors: Gillian Dickens and Deanna Noga  
Typesetter: C&M Digital (P) Ltd.  
Proofreaders: Jennifer Grubba and Theresa Kay  
Cover and Interior Designer: Scott Van Atta  
Marketing Manager: Margaret O'Connor

Copyright © 2018 by Corwin

All rights reserved. When forms and sample documents are included, their use is authorized only by educators, local school sites, and/or noncommercial or nonprofit entities that have purchased the book. Except for that usage, no part of this book may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without permission in writing from the publisher.

All trademarks depicted within this book, including trademarks appearing as part of a screenshot, figure, or other image, are included solely for the purpose of illustration and are the property of their respective holders. The use of the trademarks in no way indicates any relationship with, or endorsement by, the holders of said trademarks.

Common Core State Standards cited throughout copyright © 2010 National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved.

Printed in the United States of America

*Library of Congress Cataloging-in-Publication Data*

Names: Miles, Ruth Harbin. | Williams, Lois A. | Burke, Jim | Gojak, Linda.

Title: Your mathematics standards companion, grades 6–8 : what they mean and how to teach them / Ruth Harbin Miles, Lois A. Williams ; series creator, Jim Burke ; mathematics series creator, Linda M. Gojak.

Description: Thousand Oaks : Corwin, [2018]

Identifiers: LCCN 2017016208 | ISBN 9781506382258 (pbk. : alk. paper)

Subjects: LCSH: Mathematics—Study and teaching (Middle school)—Standards—United States.

Classification: LCC QA135.6 .M549 2018 | DDC 510.71/273—dc23  
LC record available at <https://lcn.loc.gov/2017016208>

17 18 19 20 21 10 9 8 7 6 5 4 3 2 1

**DISCLAIMER:** This book may direct you to access third-party content via Web links, QR codes, or other scannable technologies, which are provided for your reference by the author(s). Corwin makes no guarantee that such third-party content will be available for your use and encourages you to review the terms and conditions of such third-party content. Corwin takes no responsibility and assumes no liability for your use of any third-party content, nor does Corwin approve, sponsor, endorse, verify, or certify such third-party content.

# Contents

## Indexes Cross-Referencing Your State Standards I-1

## Quick Reference Guide xv

## Acknowledgments xxiii

## Letter to Grades 6–8 Teachers xxv

## Letter to Middle School Principals xxvii

## Introduction xxix

- A Brief History of Current State Standards xxix
- College and Career Ready Standards for Mathematics xxix
- Instructional Shifts xxx
- Terminology Used in This Book xxxi
- Effective Teaching Practices xxxiii
- How to Use This Book xxxiv
- Reflection Questions xxxv

## Part 1. Ratios and Proportional Relationships

- Domain Overview 2
- Suggested Materials for This Domain 3
- Key Vocabulary 3

### Grade 6

- Cluster A: *Understand ratio concepts and use ratio reasoning to solve problems.* 6
- Sample Planning Page: Ratios and Proportional Relationships, Grade 6, Cluster A 12
- Planning Page 14

### Grade 7

- Cluster A: *Analyze proportional relationships and use them to solve real-world and mathematical problems.* 16
- Sample Planning Page: Ratios and Proportional Relationships, Grade 7, Cluster A 25
- Planning Page 27
- Reflection Questions: Ratios and Proportional Relationships 28

## Part 2. The Number System

- Domain Overview 30
- Suggested Materials for This Domain 31
- Key Vocabulary 31

### Grade 6

- Cluster A: *Apply and extend previous understandings of multiplication and division to divide fractions by fractions.* 33
- Cluster B: *Compute fluently with multi-digit numbers and find common factors and multiples.* 36
- Cluster C: *Apply and extend previous understandings of numbers to the system of rational numbers.* 42

Sample Planning Page: The Number System, Grade 6, Cluster C 50  
Planning Pages 52

## Grade 7

Cluster A: *Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.* 56

Sample Planning Page: The Number System, Grade 7, Cluster A 67  
Planning Page 69

## Grade 8

Cluster A: *Know that there are numbers that are not rational, and approximate them by rational numbers.* 70

Sample Planning Page: The Number System, Grade 8, Cluster A 74  
Planning Page 76

Reflection Questions: The Number System 77

## Part 3. Expressions and Equations

Domain Overview 80  
Suggested Materials for This Domain 81  
Key Vocabulary 81

## Grade 6

Cluster A: *Apply and extend previous understandings of arithmetic to algebraic expressions.* 84  
Cluster B: *Reason about and solve one-variable equations and inequalities.* 91  
Cluster C: *Represent and analyze quantitative relationships between dependent and independent variables.* 96  
Sample Planning Page: Expressions and Equations, Grade 6, Cluster C 98  
Planning Pages 100

## Grade 7

Cluster A: *Use properties of operations to generate equivalent expressions.* 103  
Cluster B: *Solve real-life and mathematical problems using numerical and algebraic expressions and equations.* 106  
Sample Planning Page: Expressions and Equations, Grade 7, Cluster A 112  
Planning Pages 114

## Grade 8

Cluster A: *Work with radicals and integer exponents.* 116  
Cluster B: *Understand the connections between proportional relationships, lines, and linear equations.* 122  
Cluster C: *Analyze and solve linear equations and pairs of simultaneous linear equations.* 126  
Sample Planning Page: Expressions and Equations, Grade 8, Cluster A 130  
Planning Pages 131

Reflection Questions: Expressions and Equations 134

## Part 4. Functions

Domain Overview 136  
Suggested Materials for This Domain 137  
Key Vocabulary 137

## Grade 8

- Cluster A: *Define, evaluate, and compare functions.* 138
- Cluster B: *Use functions to model relationships between quantities.* 142
- Sample Planning Page: Functions, Grade 8, Cluster A 145
- Planning Pages 147
- Reflection Questions: Functions 149

## Part 5. Geometry

- Domain Overview 152
- Suggested Materials for This Domain 153
- Key Vocabulary 153

## Grade 6

- Cluster A: *Solve real-world and mathematical problems involving area, surface area, and volume.* 155
- Sample Planning Page: Geometry, Grade 6, Cluster A 161
- Planning Page 162

## Grade 7

- Cluster A: *Draw, construct, and describe geometrical figures and describe the relationships between them.* 164
- Cluster B: *Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.* 168
- Sample Planning Page: Geometry, Grade 7, Cluster B 172
- Planning Pages 174

## Grade 8

- Cluster A: *Understand congruence and similarity using physical models, transparencies, or geometry software.* 176
- Cluster B: *Understand and apply the Pythagorean Theorem.* 185
- Cluster C: *Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.* 189
- Sample Planning Page: Geometry, Grade 8, Cluster A 191
- Planning Pages 193
- Reflection Questions: Geometry 196

## Part 6. Statistics and Probability

- Domain Overview 198
- Suggested Materials for This Domain 199
- Key Vocabulary 199

## Grade 6

- Cluster A: *Develop understanding of statistical variability.* 201
- Cluster B: *Summarize and describe distributions.* 207
- Sample Planning Page: Statistics and Probability, Grade 6, Cluster B 212
- Planning Pages 214

## Grade 7

- Cluster A: *Use random sampling to draw inferences about a population.* 216
- Cluster B: *Draw informal comparative inferences about two populations.* 219

Cluster C: *Investigate chance processes and develop, use, and evaluate probability models.* 222  
Sample Planning Page: Statistics and Probability, Grade 7, Cluster C 230  
Planning Pages 232

## Grade 8

Cluster A: *Investigate patterns of association in bivariate data.* 236  
Sample Planning Page: Statistics and Probability, Grade 8, Cluster A 242  
Planning Page 244  
Reflection Questions: Statistics and Probability 245

## Resources

Table 1. Standards for Mathematical Practice 248  
Table 2. Effective Teaching Practices 251

## Reproducibles

Reproducible 1. Percent Wheel 254  
Reproducible 2. Frayer Model 255  
Reproducible 3. Net of a Cube 256  
Reproducible 4. Example for MAD (Mean Absolute Deviation) 257

## Additional Resources 259

## About the Authors 261



For downloadable versions of the Indexes Cross-Referencing  
Your State Standards, Reproducibles, and a Planning Page Template,  
visit the companion website at  
**[resources.corwin.com/yourmathcompanion6-8](http://resources.corwin.com/yourmathcompanion6-8)**.