Your Mathematics Standards Companion, Grades 3–5

What They Mean and How to Teach Them

Linda M. Gojak
Ruth Harbin Miles

Series Creator: Jim Burke
Mathematics Series Creator: Linda M. Gojak

Name: _____

Department: _____

Learning Team: _____

A JOINT PUBLICATION

CORWIN MATHEMATICS
NCTM NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS

CORWIN
A SAGE Publishing Company

FOR INFORMATION:

Corwin
A SAGE Company
2455 Teller Road
Thousand Oaks, California 91320
(800) 233-9936
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

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: Gojak, Linda. | Miles, Ruth Harbin. | Burke, Jim

Title: Your mathematics standards companion, grades 3–5 : what they mean and how to teach them / Linda M. Gojak, Ruth Harbin Miles ; series creator, Jim Burke.

Description: Thousand Oaks : Corwin, 2017. | Includes bibliographical references.

Identifiers: LCCN 2017016209 | ISBN 9781506382241 (pbk. : alk. paper)

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

Classification: LCC QA135.6 .G63925 2017 | DDC 372.7/044—dc23
LC record available at https://lccn.loc.gov/2017016209

This book is printed on acid-free paper.

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: Pam Suwinksy and Deanna Noga
Typesetter: C&M Digitals (P) Ltd.
Proofreaders: Theresa Kay and Laura Webb
Cover and Interior Designer: Scott Van Atta
Marketing Manager: Margaret O'Connor

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

Contents

Indexes Cross-Referencing Your State Standards I-1

Quick Reference Guide xv

Acknowledgments xxiii

Letter to Grades 3–5 Teachers xxv

Letter to Elementary 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 xxx
Effective Teaching Practices xxxiii
How to Use This Book xxxiv
Reflection Questions xxxv

Part 1. Operations and Algebraic Thinking

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

Grade 3

Cluster A: *Represent and solve problems involving multiplication and division.* 6
Cluster B: *Understand properties of multiplication and the relationship between multiplication and division.* 15
Cluster C: *Multiply and divide within 100.* 20
Cluster D: *Solve problems involving the four operations, and identify and explain patterns in arithmetic.* 22
Sample Planning Page: Operations and Algebraic Thinking, Grade 3, Cluster A 25
Planning Pages 27

Grade 4

Cluster A: *Use the four operations with whole numbers to solve problems.* 31
Cluster B: *Gain familiarity with factors and multiples.* 38
Cluster C: *Generate and analyze patterns.* 41
Sample Planning Page: Operations and Algebraic Thinking, Grade 4, Cluster B 44
Planning Pages 48

Grade 5

Cluster A: *Write and interpret numerical expressions.* 51
Cluster B: *Analyze patterns and relationships.* 54
Sample Planning Page: Operations and Algebraic Thinking, Grade 5, Cluster A 57
Planning Pages 58

Reflection Questions: Operations and Algebraic Thinking 60

Part 2. Number and Operations in Base Ten

Domain Overview 62

Suggested Materials for This Domain 63

Key Vocabulary 63

Grade 3

Cluster A: *Use place value understanding and properties of operations to perform multi-digit arithmetic.* 65

Sample Planning Page: Number and Operations in Base Ten, Grade 3, Cluster A 72

Planning Page 73

Grade 4

Cluster A: *Generalize place value understanding for multi-digit whole numbers.* 74

Cluster B: *Use place value understanding and properties of operations to perform multi-digit arithmetic.* 79

Sample Planning Page: Number and Operations in Base Ten, Grade 4, Cluster B 86

Planning Pages 88

Grade 5

Cluster A: *Understand the place value system.* 90

Cluster B: *Perform operations with multi-digit whole numbers and with decimals to hundredths.* 97

Sample Planning Page: Number and Operations in Base Ten, Grade 5, Cluster B 103

Planning Pages 105

Reflection Questions: Number and Operations in Base Ten 107

Part 3. Number and Operations—Fractions

Domain Overview 110

Suggested Materials for This Domain 111

Key Vocabulary 111

Grade 3

Cluster A: *Develop understanding of fractions as numbers.* 113

Sample Planning Page: Number and Operations—Fractions, Grade 3, Cluster A 123

Planning Page 125

Grade 4

Cluster A: *Extend understanding of fraction equivalence and ordering.* 126

Cluster B: *Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.* 130

Cluster C: *Understand decimal notation for fractions, and compare decimal fractions.* 141

Sample Planning Page: Number and Operations—Fractions, Grade 4, Cluster C 147

Planning Pages 149

Grade 5

Cluster A: *Use equivalent fractions as a strategy to add and subtract fractions.* 152

Cluster B: *Apply and extend previous understandings of multiplication and division to multiply and divide fractions.* 155

Sample Planning Page: Number and Operations—Fractions, Grade 5, Cluster A 169
Planning Pages 171
Reflection Questions: Number and Operations—Fractions 173

Part 4. Measurement and Data

Domain Overview 176
Suggested Materials for This Domain 177
Key Vocabulary 177

Grade 3

Cluster A: *Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.* 180
Cluster B: *Represent and interpret data.* 183
Cluster C: *Geometric measurement: Understand concepts of area and relate area to multiplication and to addition.* 186
Cluster D: *Geometric measurement: Recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.* 192
Sample Planning Page: Measurement and Data, Grade 3, Cluster A 194
Planning Pages 195

Grade 4

Cluster A: *Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.* 199
Cluster B: *Represent and interpret data.* 203
Cluster C: *Geometric measurement: Understand concepts of angle and measure angles.* 205
Sample Planning Page: Measurement and Data, Grade 4, Cluster A 209
Planning Pages 210

Grade 5

Cluster A: *Convert like measurement units within a given measurement system.* 213
Cluster B: *Represent and interpret data.* 215
Cluster C: *Geometric measurement: Understand concepts of volume and relate volume to multiplication and to addition.* 217
Sample Planning Page: Measurement and Data, Grade 5, Cluster C 221
Planning Pages 222
Reflection Questions: Measurement and Data 225

Part 5. Geometry

Domain Overview 228
Suggested Materials for This Domain 229
Key Vocabulary 229

Grade 3

Cluster A: *Reason with shapes and their attributes.* 232
Sample Planning Page: Geometry, Grade 3, Cluster A 235
Planning Page 236

Grade 4

Cluster A: *Draw and identify lines and angles, and classify shapes by properties of their lines and angles.* 237

Sample Planning Page: Geometry, Grade 4, Cluster A 241

Planning Page 242

Grade 5

Cluster A: *Graph points on the coordinate plane to solve real-world and mathematical problems.* 243

Cluster B: *Classify two-dimensional figures into categories based on their properties.* 246

Sample Planning Page: Geometry, Grade 5, Cluster A 249

Planning Pages 250

Reflection Questions: Geometry 252

Resources

Table 1. Addition and Subtraction Situations, Grades 3–5 254

Table 2. Multiplication and Division Situations, Grades 3–5 256

Table 3. Standards for Mathematical Practice 259

Table 4. Effective Teaching Practices 262

Reproducibles

Reproducible 1. Hundreds Chart 266

Reproducible 2. Place Value Chart to Hundreds 267

Reproducible 3. Grid Paper 268

Reproducible 4. Base-Ten Blocks 269

Reproducible 5. Fraction Area Models (Circular) 270

Reproducible 6. Fraction Area Models (Rectangular) 273

Reproducible 7. Fraction Strips/Bars 275

Reproducible 8. Place Value Chart 277

Reproducible 9. Geoboard Paper 278

Reproducible 10. Dot Paper (Centimeter) 279

Reproducible 11. Pattern Blocks 280

Reproducible 12. Tangram Pattern 281

Additional Resources 282

About the Authors 283

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/yourmathcompanion3-5**.