



contents

Volume 109, Number 3, October 2015

features

- 179** **Insights from the MAA National Study of College Calculus**
David Bressoud
Students who succeed in high school calculus become discouraged and quit in college. Why?
- 186** **Rotating Solids and Flipping Instruction**
Lynette Grypp and Jennifer Luebeck
Action research helped one classroom teacher make thoughtful, data-based decisions about embracing new strategies and technologies.
- 194** **Probability with Collaborative Data Visualization Software**
Melinda B. N. Willis, Sue Hay, Fred G. Martin, Michelle Scribner-MacLean, and Ivan Rudnicki
The data collection and analysis tool iSENSE helps algebra students collect, share, and explore their own experimental data while learning about the law of large numbers.
- 206** **Putting Mathematical Tasks into Context**
Courtney R. Nagle and Jodie L. Styers
Perspective from the top of a roller coaster engages students in reasoning about slope and function.

on the cover

Surprise, delight, and personal reaction to a roller-coaster ride bring perspective to the concept of slope by “Putting Mathematical Tasks into Context” (pp. 206–13). Authors Courtney R. Nagle and Jodie L. Styers peak students’ interest with a heady activity about increasing and decreasing functions. See for yourself whether steepness is in the eye of the beholder.

COVER: BRAND X PICTURES/THINKSTOCK



NATIONAL COUNCIL OF
TEACHERS OF MATHEMATICS

MATHEMATICS teacher

EDITORIAL PANEL

STEVE INGRASSIA, Hawken Upper School, Gates Mills, Ohio; *Chair*
ELIZABETH APPELBAUM, Blue Valley School District, Overland Park, Kansas
MICHELLE BERRY, Albemarle High School, Charlottesville, Virginia
LUAJEAN BRYAN, Walker Valley High School, Cleveland, Tennessee (retired)
ÓSCAR CHÁVEZ, University of Texas at San Antonio
JON D. DAVIS, Western Michigan University, Kalamazoo; *Digital Liaison*
PAUL KELLEY, Anoka High School, Anoka, Minnesota; *Board of Directors Liaison*
ALISON LANGSDORF, Weston High School, Weston, Massachusetts
IRINA LYUBLINSKAYA, City University of New York College of Staten Island, School of Education
MEGAN SNOW, Barrington Municipal High School, Nova Scotia, Canada

JOURNALS STAFF

KEN KREHBIEL, *Associate Executive Director for Communications*
JOANNE HODGES, *Senior Director of Publications*
TARA SLESAR, *Journal Editor*
GRETCHEN SMITH MUI, *Copy Editor*
SHEILA J. BARKER, *Review Services Assistant*
CHRISTINE A. NODDIN, *Publications Assistant*
RICK ANDERSON, LUANNE M. FLOM, ELIZABETH M. SKIPPER,
PAMELA GRAINGER TILSON, *Contributing Editors*

ADVERTISING STAFF

KIM KELEMEN, *National Sales Manager, The Townsend Group*
Kkelemen@townsend-group.com; (301) 215-6710, ex. 103

NCTM BOARD OF DIRECTORS

DIANE J. BRIARS, Pittsburgh, Pennsylvania; *President*
MATTHEW R. LARSON, Lincoln Public Schools, Nebraska; *President-Elect*
ROBERT M. DOUCETTE, NCTM, *Executive Director*
JENNIFER BAY-WILLIAMS, University of Louisville, Kentucky
NADINE BEZUK, San Diego State University, California
FLORENCE GLANFIELD, University of Alberta, Edmonton
PAUL KELLEY, Anoka High School, Anoka, Minnesota
CATHY MARTIN, Denver Public Schools, Colorado
RUTH HARBIN MILES, Falmouth Elementary School, Stafford, Virginia
JANE PORATH, Traverse City East Middle School, Michigan
JOHN SANGIOVANNI, Howard County Public Schools, Maryland
DENISE A. SPANGLER, University of Georgia, Athens
MARILYN E. STRUTCHENS, Auburn University, Alabama
TRENA L. WILKERSON, Baylor University, Waco, Texas
ROSE MARY ZBIEK, Pennsylvania State University, University Park

To contact a journal staff person, e-mail mt@nctm.org.

Mission Statement: The National Council of Teachers of Mathematics is the public voice of mathematics education, supporting teachers to ensure equitable mathematics learning of the highest quality for all students through vision, leadership, professional development, and research.

Mathematics Teacher, an official NCTM journal, is devoted to improving mathematics instruction for grades 8–14 and supporting teacher education programs. It provides a forum for sharing activities and pedagogical strategies, deepening understanding of mathematical ideas, and linking mathematics education research to practice. *Mathematics Teacher* solicits submissions from high school mathematics teachers, university mathematicians, and mathematics educators and strongly encourages manuscripts in which ideas relate to classroom practice. Manuscripts previously published in other journals or books are not acceptable. NCTM publications present a variety of viewpoints. The views expressed or implied in this journal, unless otherwise noted, should not be interpreted as official NCTM positions. The appearance of advertising in NCTM's publications and on its websites in no way implies endorsement of approval by NCTM of any advertising claims or of the advertiser, its product, or its services. NCTM disclaims any liability whatsoever in connection with advertising appearing in NCTM's publications and on its websites.

All correspondence should be addressed to the *Mathematics Teacher*, 1906 Association Drive, Reston, VA 20191-1502. Manuscripts should be prepared according to the *Chicago Manual of Style* and the United States Metric Association's *Guide to the Use of the Metric System*. No author identification should appear on the manuscript; the journal uses a blind-review process. To send submissions, access mt.msubmit.net. Send letters to the editor to mt@nctm.org.

Permission to photocopy material from *Mathematics Teacher* is granted to persons who wish to distribute items individually (not in combination with other articles or works), for educational purposes, in limited quantities, and free of charge or at cost; to librarians who wish to place a limited number of copies on reserve; to authors of scholarly papers; and to any party wishing to make one copy for personal use. Permission must be obtained to use journal material for course packets, commercial works, advertising, or professional development purposes. Uses of journal material beyond those outlined above may violate U.S. copyright law and must be brought to the attention of the National Council of Teachers of Mathematics. For a complete statement of NCTM's copyright policy, see the NCTM website, www.nctm.org.

For information on **article photocopies or back issues**, contact the Customer Care Department in the headquarters office.

A cumulative index appears on the NCTM website at www.nctm.org/mt/mt-indexes.htm. The *Mathematics Teacher* is indexed in *Biography Index*, *Contents Pages in Education*, *Current Index to Journals in Education*, *Education Index*, *Exceptional Child Education Resources*, *Literature Analysis of Microcomputer Publications*, *Mathematical Reviews*, *Media Review Digest*, and *Zentralblatt für Didaktik der Mathematik*.

Information is available from the Headquarters Office or online at www.nctm.org/membership regarding the three **other official journals**, *Teaching Children Mathematics*, *Mathematics Teaching in the Middle School*, and the *Journal for Research in Mathematics Education*. Dues support the development, coordination, and delivery of NCTM's services. Dues for individual membership are \$87 (U.S.), which includes \$37 for a *Mathematics Teacher* subscription. Each additional school journal (*Mathematics Teaching in the Middle School* and *Teaching Children Mathematics*) subscription is \$37. Each additional subscription to the *Journal for Research in Mathematics Education* is \$64. Foreign subscribers add \$18 (U.S.) postage for the first journal and \$4 (U.S.) postage for each additional journal. Special rates for students, institutions, bulk subscribers, and emeritus members are available from the Headquarters Office.

The *Mathematics Teacher* (ISSN 0025-5769) (IPM 1213431) is published monthly except June and July, with a combined December/January issue, by the National Council of Teachers of Mathematics at 1906 Association Drive, Reston, VA 20191-1502. Periodicals postage paid at Herndon, Virginia, and at additional mailing addresses. POSTMASTER: Send address changes to *Mathematics Teacher*, 1906 Association Drive, Reston, VA 20191-1502. Telephone: (703) 620-9840; orders: (800) 235-7566; fax: (703) 476-2970; e-mail: nctm@nctm.org. © 2015. The National Council of Teachers of Mathematics, Inc. Printed in the U.S.A.

departments

- 164 **From the Editorial Panel**
Looking through the Lens:
(1 Picture = 1000 Words) × 100
- 165 **Reader Reflections**
- 168 **Media Clips**
Counting the Crowd//Taxing the Garden
*David D. Ebert//Julia Morriss, Emily Broude,
and Robert Lesser*
- 172 **Mathematical Lens**
The 100-Block Walk for Math (Part 1)
- 200 **October Calendar and Solutions**
- 214 **Activities for Students**
From Circle to Hyperbola in Taxicab Geometry
Ruth I. Berger
- 221 **Technology Tips**
Using Surfer to Investigate Algebraic Surfaces
David Grünberg and Andreas Matt
- 228 **Delving Deeper**
A Transformational Approach
to Slip-Slide Factoring
Jeffrey Steckroth
- 236 **For Your Information**



221 |

- 240 **The Back Page: My Favorite Lesson**
Repeated Square Roots
Michael Todd Edwards and James Quinlan

calls for manuscripts

- 174 **Mathematical Lens**
- 191 **Connecting Research to Teaching**
- 220 **2017 Focus Issue: Nurturing Persistent Problem Solvers**
- 237 **Mathematizing the World: An Invitation to Modeling**

more**4U**

Look online for these additional items:

- “Putting Mathematical Tasks into Context” (p. 206): A graphic organizer to help students explain mathematical ideas in context
- Mathematical Lens (p. 172): Four photographs for students’ own mathematical questions
- Activities for Students (p. 214): Additional problems related to parabolas in taxicab geometry

The more4U content, an additional benefit, is for members only.

in the next issue

Coming in November 2015

FOCUS ISSUE 2015

Creating
Classroom
Communities

