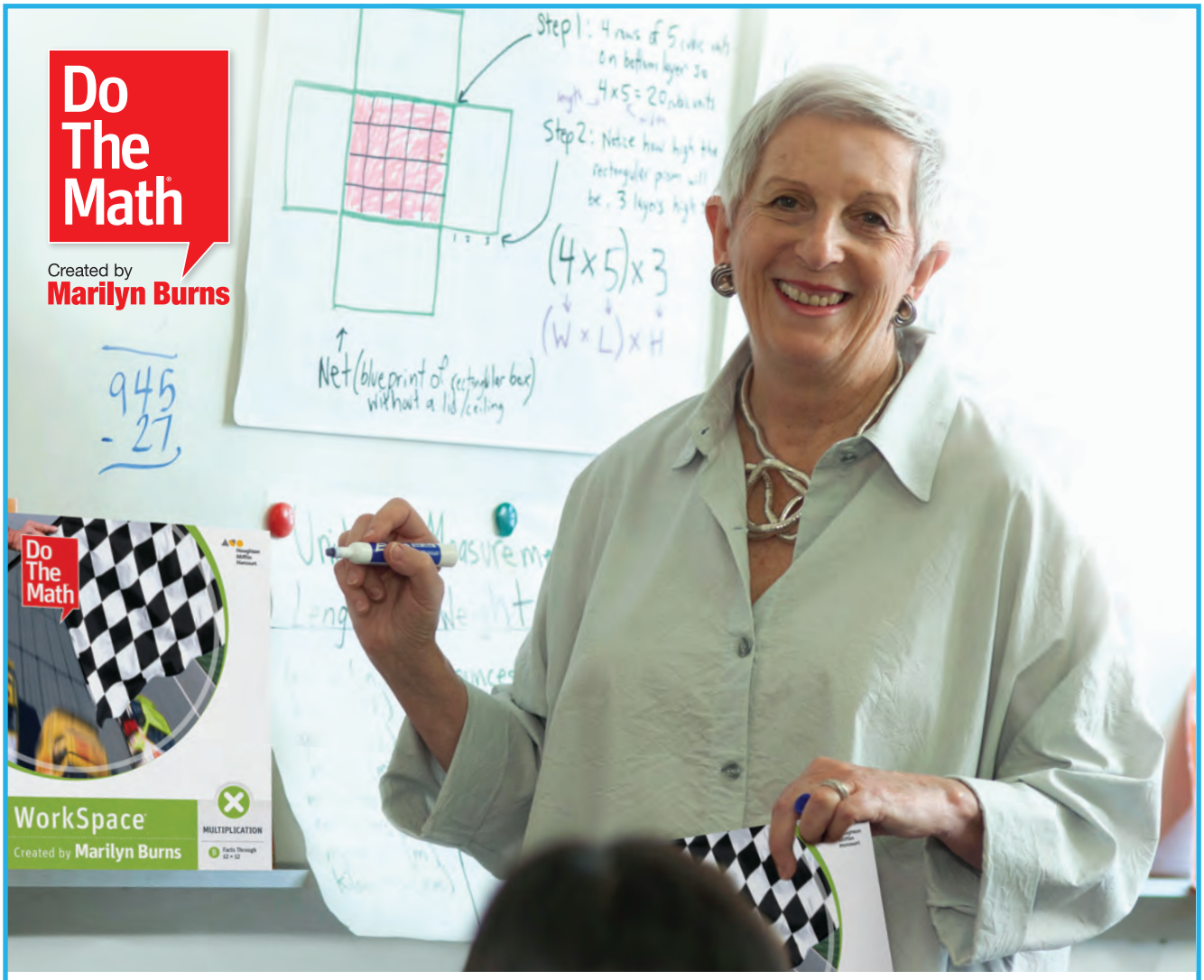
Heinemann.com/DoTheMath

Heinemann
Dedicated to Teachers



THINK.
REASON.
UNDERSTAND.

Help All Students in Grades 1–5+ Build Numerical Reasoning

A Program Designed for Teachers, by Teachers

Do The Math was first published in 2008. Since then, there has been an overwhelmingly positive response from educators.

The program was initially intended to provide intervention for students who had fallen behind, yet many teachers reported using the modules in a wide variety of settings—including whole-class instruction! The lessons are effective for building all students' understanding, skills, number sense, and engaging them with the mathematical practices.

Do The Math was developed by a Math Solutions® team who worked alongside teachers in schools across the country, identifying enhancements to make the *Do The Math* experience an even better one.

With more digital tools, interactive games, and increased opportunities for student involvement, *Do The Math* continues to support teachers in the important work of helping struggling students become lifelong mathematicians.

All the best,

MARILYN BURNS

is one of today's most highly respected math educators. She is the creator and founder of **Math Solutions®**, and has dedicated her career to the improvement of math instruction across grades K–8. Marilyn has taught in the classroom for many years, written children's books, led in-service workshops, written professional development publications for teachers and administrators, and created professional development videos. Marilyn continues to teach regularly in the classroom, finding the experience essential to developing and testing new ideas and materials. To see Marilyn in action, follow her online:

Twitter: @mburnsmath

Blog: marilynburnsmathblog.com

Do The Math®

Created by Marilyn Burns

Help All Students in Grades 1–5+ Build Numerical Reasoning

INSIDE

SUPPORT FOR STUDENTS AND TEACHERS

Do The Math restores the focus on effective teaching by providing students with carefully scaffolded instruction and teachers with the tools and resources they need to serve every student.

3 Elements of Effective Intervention

1. TARGETED CONTENT BUILDS AND STRENGTHENS NUMERICAL REASONING.

Do The Math focuses on understanding and skills with whole numbers and fractions in order to build or rebuild critical foundations. With scaffolded instruction, students progress from the basics to more complex operational work, while learning, processing, and deepening understanding at an appropriate pace.

2. TEACHER SUPPORT ENSURES CONFIDENT, EFFECTIVE INSTRUCTION.

Professional learning and point-of-use support are embedded into every lesson with clear steps for effective and easily managed teaching. These resources are strategically placed throughout the program to ensure all teachers will feel confident in delivering instruction.

3. STUDENT ENGAGEMENT STRATEGIES PROVIDE AN EXPLICIT PATH TO SUCCESS.

Do The Math features eight classroom-tested instructional practices for struggling students: teaching for understanding, scaffolded content, multiple strategies, mathematical thinking, classroom routines, independent student work, vocabulary and language, and assessment and differentiation. These practices facilitate differentiation to meet the needs of every student.

"Immediately I saw a difference in my students. They were so excited; *Do The Math* is so hands-on. It just changed the way we were talking about math."

— MS. KERR, FOURTH-GRADE TEACHER, NEW YORK CITY PUBLIC SCHOOLS

TARGETED CONTENT

***Do The Math* develops students' understanding of whole number, addition and subtraction** through concrete models, visual tools, and strategies based on place-value and the relationship between addition and subtraction.

***DO THE MATH* SUPPORTS STUDENTS WITH THIS CONTENT BY:**

- Using models such as ten-frames and counters before transitioning to abstract computation.
- Breaking the numbers into place-value parts, which maintains the meaning of each digit when adding and subtracting.
- Introducing strategies for mental computation and developing proficiency through practice and game play.
- Focusing on making estimates and considering the known and unknown quantities in problems that can be solved with addition and subtraction.

***Do The Math* builds students' understanding of multiplication** using contextual situations, equations, and rectangular arrays. Students develop skills with solving word problems using place-value strategies and properties of operations.

***DO THE MATH* SUPPORTS STUDENTS WITH THIS CONTENT BY:**

- Introducing multiplication through the combination of equal groups.
- Representing combining equal groups with related addition and multiplication equations.
- Analyzing products to investigate patterns and relationships.
- Offering games and partner activities to develop, cement, and extend student understanding.
- Providing opportunities to practice multiplication using strategies that focus on the value of each digit.

Do The Math focuses on building an understanding of Number & Operations, the cornerstone of elementary math, and organizes instruction into four topics: Addition & Subtraction, Multiplication, Division, and Fractions. Modules can be implemented at any grade level, allowing for flexibility as students begin where they need support.

***Do The Math* helps students understand division** as grouping and sharing, interpreting quotients, solving word problems, and computing quotients and remainders using place-value strategies, the properties of operations, and the relationship between multiplication and division.

***DO THE MATH* SUPPORTS STUDENTS WITH THIS CONTENT BY:**

- Focusing on 10 as the basis of our number system.
- Highlighting the connection between multiplication and division.
- Promoting sense-making when dividing greater numbers by focusing on taking out partial quotients—to make division more meaningful and manageable for struggling students.
- Providing problems that develop an understanding of two types of division problems: grouping and sharing.

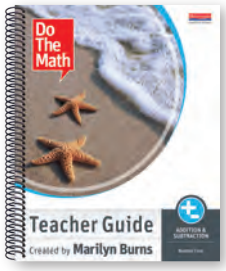
***Do The Math* helps students understand fractions,** explain when fractions are equivalent using multiple strategies, compare and order fractions, and add and subtract fractions with like and unlike denominators.

***DO THE MATH* SUPPORTS STUDENTS WITH THIS CONTENT BY:**

- Using concrete materials like fraction strips to help students develop an understanding of fraction relationships, recognize the need for common denominators, and learn how to generate equivalent fractions.
- Providing students with multiple strategies for comparing and ordering fractions.
- Developing the computational tools and strategies to add and subtract fractions—including improper fractions and mixed numbers with like and unlike denominators.

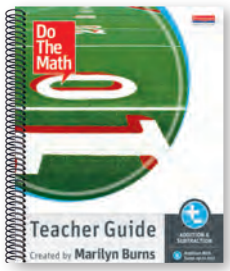
MODULES SUPPORT **SMALL-GROUP & WHOLE-CLASS** INSTRUCTION*

ADDITION & SUBTRACTION



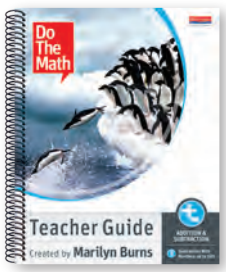
NUMBER CORE

Supports the development of quantity by using benchmark numbers, thinking flexibly about composing and decomposing numbers, and building facility with figuring sums.



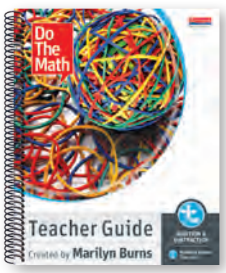
A: ADDITION WITH SUMS UP TO 100

Builds on the big idea that "10" is an organizer for our number system.



B: SUBTRACTION WITH NUMBERS UP TO 100

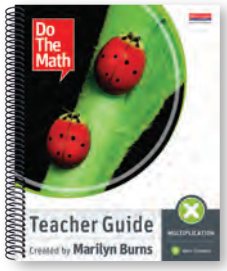
Reinforces addition and subtraction as inverse operations, teaches the three meanings of subtraction: take-away, missing parts, and comparison problems.



C: NUMBERS GREATER THAN 100

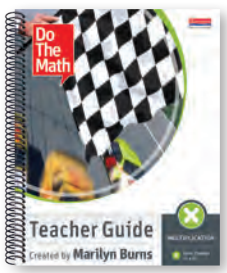
Applies these big ideas to calculations with greater numbers and provides strategies for solving word problems.

MULTIPLICATION



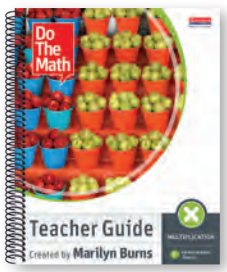
A: BASIC CONCEPTS

Provides visual and contextual models to help students understand the meaning of multiplication—supporting the shift from thinking additively to thinking multiplicatively.



B: FACTS THROUGH 12x12

Uses an array model to represent the basic facts and demonstrate key concepts and strategies for multiplication.

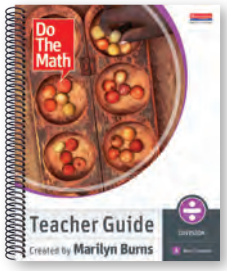


C: FACTORS GREATER THAN 12

Develops strategies for making estimates and computing products with two- and three-digit factors, using the distributive property and multiplying by multiples of 10.

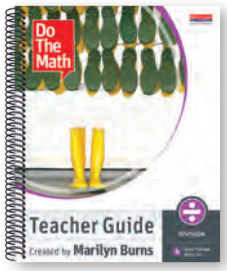
***Do The Math* topics** build from basic conceptual understanding to skills development and applications with larger numbers. Each module includes thirty **30-minute lessons**.

DIVISION



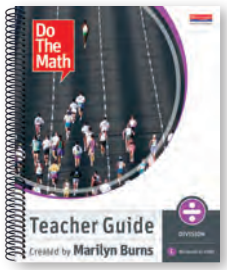
A: BASIC CONCEPTS

Build upon the idea that division is inverse to multiplication and provides computational methods for solving division problems, using contextual and concrete methods to support the two meanings of division—sharing and ungrouping.



B: FACTS THROUGH 100÷10

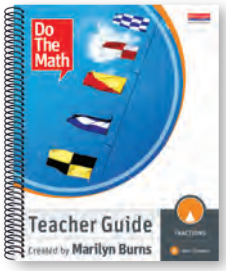
Applies the inverse relationship between multiplication and division to make sense of divisibility and the concept of taking out a quantity by groups of 10.



C: DIVIDENDS TO 1000

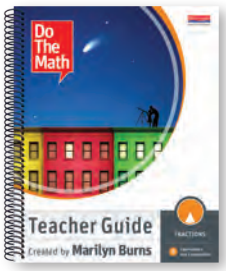
Extends to dividing two- and three-digit dividends by two-digit divisors, engages students in exploring divisibility, and provides experiences with solving contextual problems involving greater numbers.

FRACTIONS



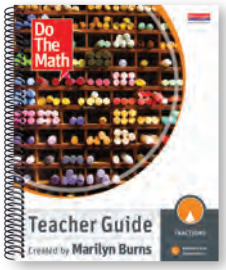
A: BASIC CONCEPTS

Connects and builds upon the big ideas of whole numbers as they apply to fractions, using concrete materials to help students give meaning to the abstract idea of fractions.



B: EQUIVALENCE AND COMPARISON

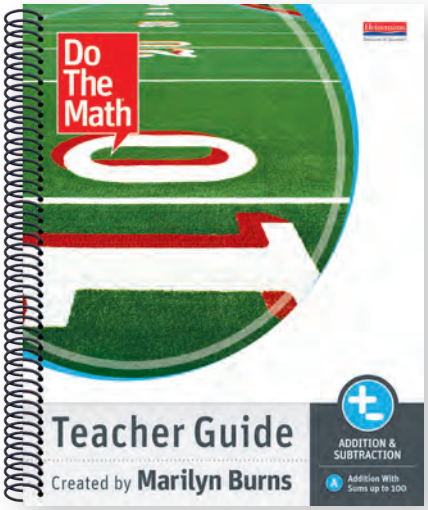
Helps students learn key strategies for comparing and ordering fractions, while keeping the instructional focus on the meaning of the fractions being compared.



C: ADDITION AND SUBTRACTION

Builds on what students have learned in order to develop the computational tools and strategies to add and subtract fractions, including improper fractions and mixed numbers with like and unlike denominators.

*Small-group modules include materials for one teacher and eight students, while whole-class modules include materials for one teacher and twenty-four students. Additional student and teacher materials are also available.



STRUCTURED FOR SUCCESS

1

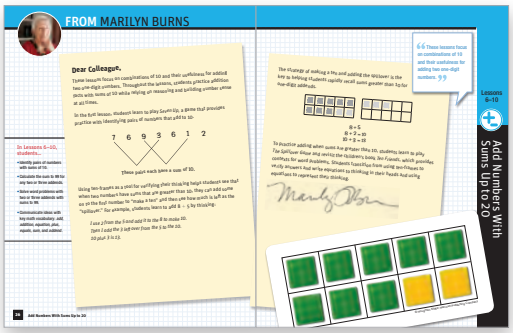
2

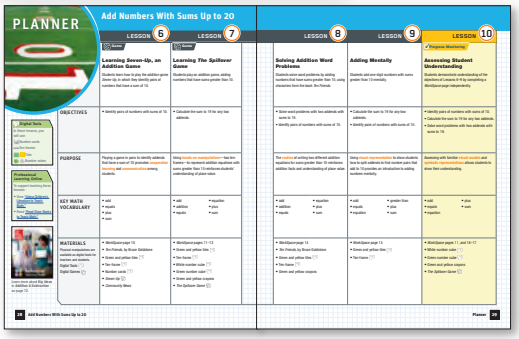
BEGINNING-OF-MODULE ASSESSMENT

Students complete the online assessment as a pre-module snapshot of what they know.

PLAN

Preparation materials are provided before each set of five lessons. This includes a letter from Marilyn Burns explaining the context and goals of the upcoming lessons and a planner.





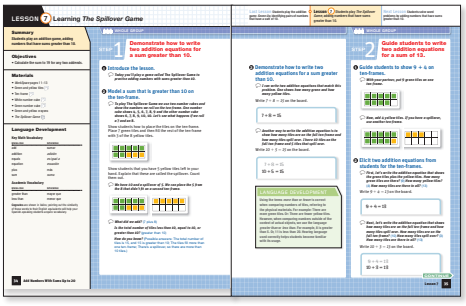
Whether used for core instruction in numerical reasoning, pull-out intervention, or summer-school settings, *Do The Math* provides effective instruction that includes opportunities for formative assessment to monitor student progress and differentiation.

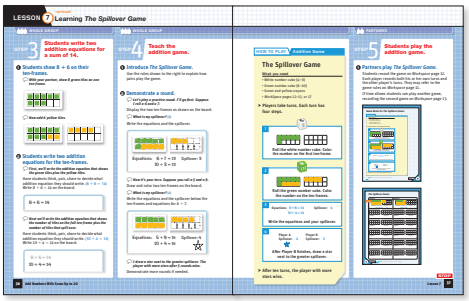
Teach a total of 30 lessons by repeating steps 2 through 4.

3

TEACH THE LESSONS

Each lesson begins with a sidebar containing the Lesson Summary, Objectives, Materials, Preparation, and Language Development, followed by step-by-step instruction.

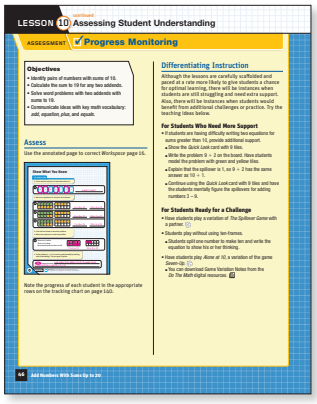




4

ASSESS STUDENT UNDERSTANDING

Every fifth lesson is an opportunity to monitor student progress with Show What You Know *WorkSpace* pages. The CheckPoint page provides ideas for differentiating instruction and offers additional practice.



Middle-of-Module Assessments are also available in *Progress Space* to monitor progress.

5

END-OF-MODULE ASSESSMENT

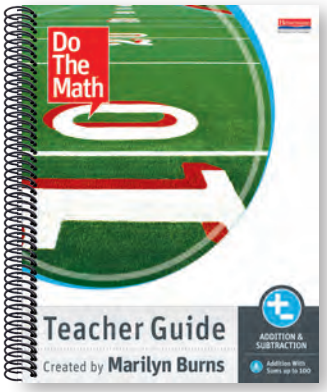
This online assessment measures student growth when compared with the performance of the Beginning-of-Module Assessment.

WHAT'S INCLUDED

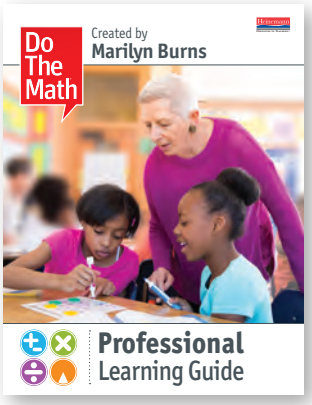
TEACHING RESOURCES

All teaching resources for each module are stored in the **Teacher Bookcase** for clear instructional guidance and easy lesson planning.

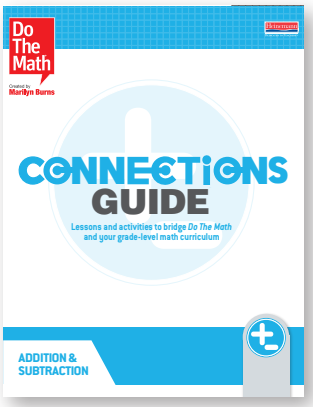
What's inside:
Teacher Guide • Professional Learning Guide • Connections Guide • Read Alouds • Annotated Workspace



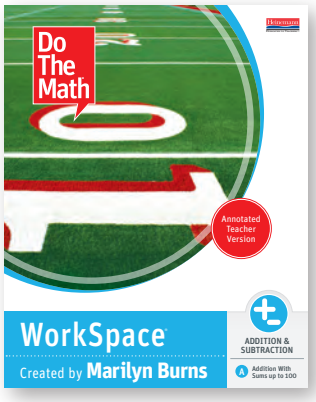
TEACHER GUIDE
Includes step-by-step teaching instructions, guidance for monitoring student progress, and specific information about how to use the Classroom Materials and mTools effectively.



PROFESSIONAL LEARNING GUIDE
Provides a comprehensive overview of the program architecture and instructional strategies.



CONNECTIONS GUIDE
provides instructional lessons that encourage connections between the concepts taught in students' grade-level math instruction and the strategies introduced in *Do The Math.*



ANNOTATED *WORKSPACE*®
The annotated *WorkSpace* provides clear representations of model student answers to help teachers provide timely progress monitoring.

Do The Math includes a range of exciting print and digital resources to support teachers and their students.

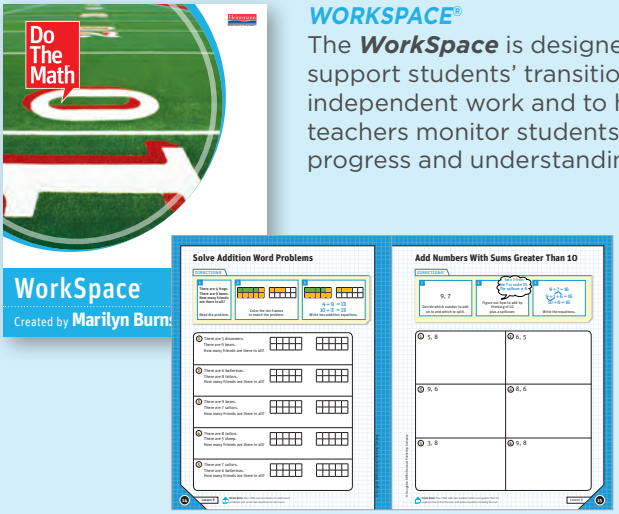
STUDENT RESOURCES

READ ALOUDS

Each module incorporates children's literature to support mathematics and provide a springboard for instruction.

DIGITAL TEACHER EXPERIENCE

An online experience provides teachers with mTools, games, and professional learning resources at their fingertips. It also includes access to the **Progress Space**—an online assessment and reporting tool!

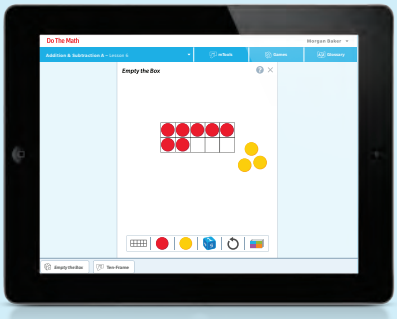


WORKSPACE®

The ***WorkSpace*** is designed to support students' transition to independent work and to help teachers monitor students' progress and understanding.

CLASSROOM MATERIALS BOX

A complete set of hands-on manipulatives and materials to support and extend student learning throughout the modules.



DIGITAL STUDENT EXPERIENCE

Your students' favorite games and interactive visual models are now available on tablets to provide additional practice. Students build mathematical understanding by exploring exciting games and digital tools.

TEACHER SUPPORT

Lesson Objectives identify the key concepts and skills for each lesson.

List of Materials includes resources that teachers will need from the Classroom Materials box or online mTools and games.

Key Math Vocabulary for the lesson is provided in both English and Spanish. Math vocabulary is explicitly taught through a vocabulary routine.

Additional Suggestions for teachers are provided for Language Development, Supporting Instruction, and Mathematics Background.

LESSON 4 Writing Fraction Equations

Summary

Students identify fraction pieces that exactly cover a whole and write equations to show the sum.

Objectives

- Name parts of a whole as fractions and use standard notation.
- Add fractions.

Materials

- *WorkSpace* pages 4–5
- Fraction strips
- Magnetic fraction strips
- Red fraction cube
- *Cover Up*

Language Development

Key Math Vocabulary

ENGLISH	SPANISH
equation	*ecuación*
fraction	*fracción*, quebrado
one-eighth	un octavo
one-fourth	un cuarto
one-half	un medio
one-sixteenth	un dieciseisavo
whole	entero

Academic Vocabulary

ENGLISH	SPANISH
addend	sumando
sum*	*suma*

Cognates are shown in italics; pointing out the similarity of these words to their English equivalents will help your Spanish-speaking students acquire vocabulary.

* See page 18 for more support on developing language for all students.

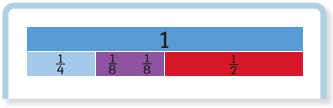
WHOLE GROUP

STEP 1 **Model fraction equations for sums of 1.**

1 Introduce the lesson.

Today you'll learn an activity called* Cover the Whole.** ***It will help you learn how to write equations with fractions.

Display the blue whole magnetic strip with a train of fractions lined up below it as shown.



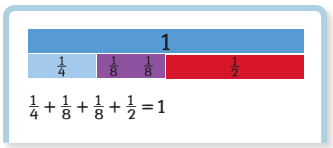
2 Demonstrate how to write an equation with fractions.

Ask a student to name each of the fraction pieces in order. As he or she names them, write the fractions on the board with a plus sign between each.

What is the sum of these fractions? (1)

How do you know? (The fraction pieces put together are the same length as the whole piece.)

Write = *1* on the board.



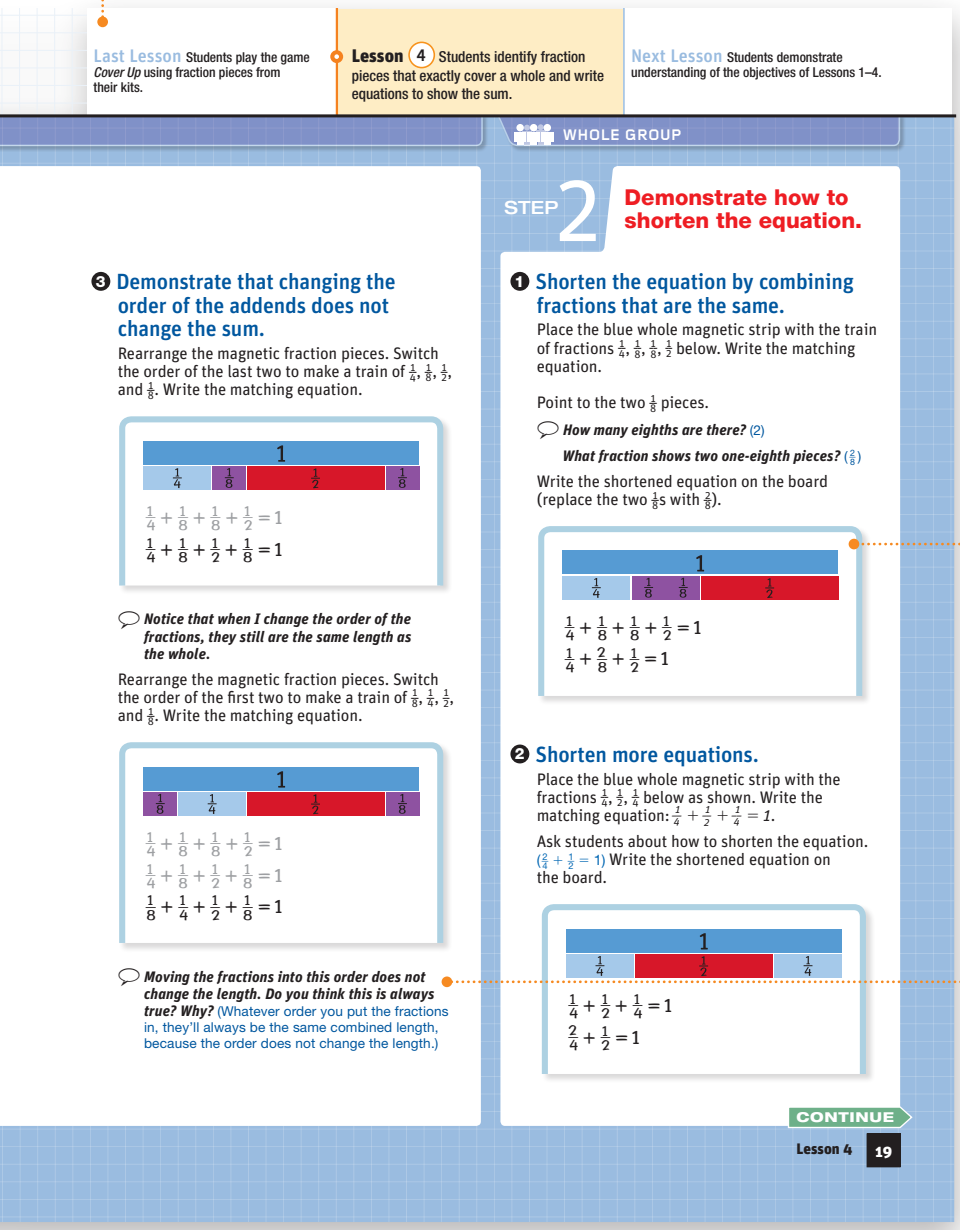
LANGUAGE DEVELOPMENT

Introduce *sum* to students who are not familiar with the word. Write *sum* on the board and explain that a *sum* is the answer you get when you add two or more numbers. Point to the sum in the fraction equation.

Point out the difference between the word *some* and the word *sum*.

Do The Math is designed to help teachers develop the foundations of mathematical understanding for all students. The *Teacher Guide* models mathematical thinking, includes visual representations, and provides point-of-use support to better serve students' individual needs.

Step-by-step instruction provides careful scaffolding of the mathematics content.



Last Lesson Students play the game *Cover Up* using fraction pieces from their kits.

Lesson 4 Students identify fraction pieces that exactly cover a whole and write equations to show the sum.

Next Lesson Students demonstrate understanding of the objectives of Lessons 1–4.

WHOLE GROUP

STEP 2 **Demonstrate how to shorten the equation.**

❸ Demonstrate that changing the order of the addends does not change the sum.

Rearrange the magnetic fraction pieces. Switch the order of the last two to make a train of $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{2}$, and $\frac{1}{8}$. Write the matching equation.

1 | $\frac{1}{4}$ | $\frac{1}{8}$ | $\frac{1}{2}$ | $\frac{1}{8}$

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

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

Notice that when I change the order of the fractions, they still are the same length as the whole.

Rearrange the magnetic fraction pieces. Switch the order of the first two to make a train of $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{1}{8}$. Write the matching equation.

1 | $\frac{1}{8}$ | $\frac{1}{4}$ | $\frac{1}{2}$ | $\frac{1}{8}$

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

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

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

Moving the fractions into this order does not change the length. Do you think this is always true? Why? (Whatever order you put the fractions in, they'll always be the same combined length, because the order does not change the length.)

❶ Shorten the equation by combining fractions that are the same.

Place the blue whole magnetic strip with the train of fractions $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{8}$, $\frac{1}{2}$ below. Write the matching equation.

Point to the two $\frac{1}{8}$ pieces.

How many eighths are there? (2)

What fraction shows two one-eighth pieces? ($\frac{2}{8}$)

Write the shortened equation on the board (replace the two $\frac{1}{8}$s with $\frac{2}{8}$).

1 | $\frac{1}{4}$ | $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{2}$

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

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

❷ Shorten more equations.

Place the blue whole magnetic strip with the fractions $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{4}$ below as shown. Write the matching equation: $\frac{1}{4}+\frac{1}{2}+\frac{1}{4}=1$.

Ask students about how to shorten the equation. ($\frac{2}{4}+\frac{1}{2}=1$) Write the shortened equation on the board.

1 | $\frac{1}{4}$ | $\frac{1}{2}$ | $\frac{1}{4}$

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

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

CONTINUE

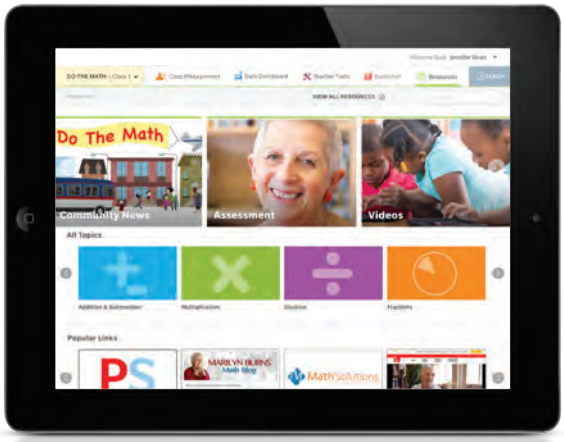
Lesson 4 19

Instruction includes visual representations of the mTools that teachers and students may model on the interactive whiteboard and student tablets.

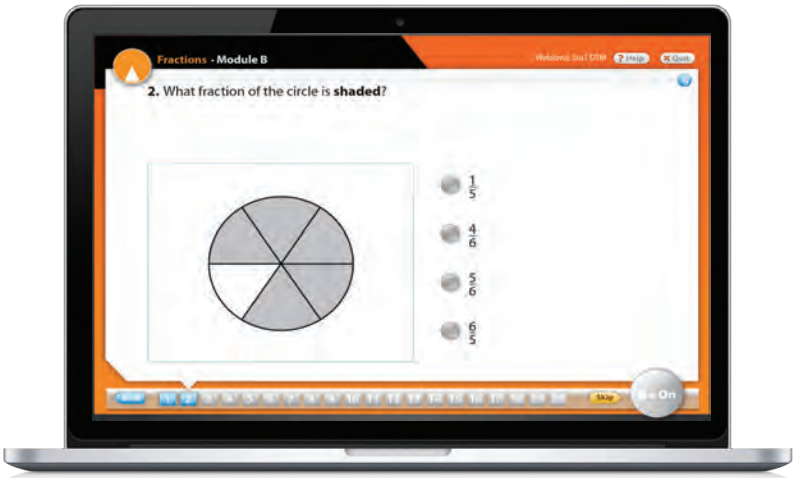
Speech bubbles give teachers guidance for modeling, reasoning, and asking questions to elicit student thinking.

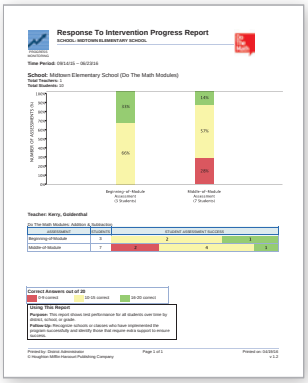
BETTER INSIGHT, BETTER RESULTS

The Digital Teacher Experience gives teachers access to professional resources, interactive visual models, and online games to create an engaging classroom experience for every lesson.



▲ **PLAN & PREPARE** Videos, instructional add-ons, downloads, and more ensure that teachers are fully supported and effective.



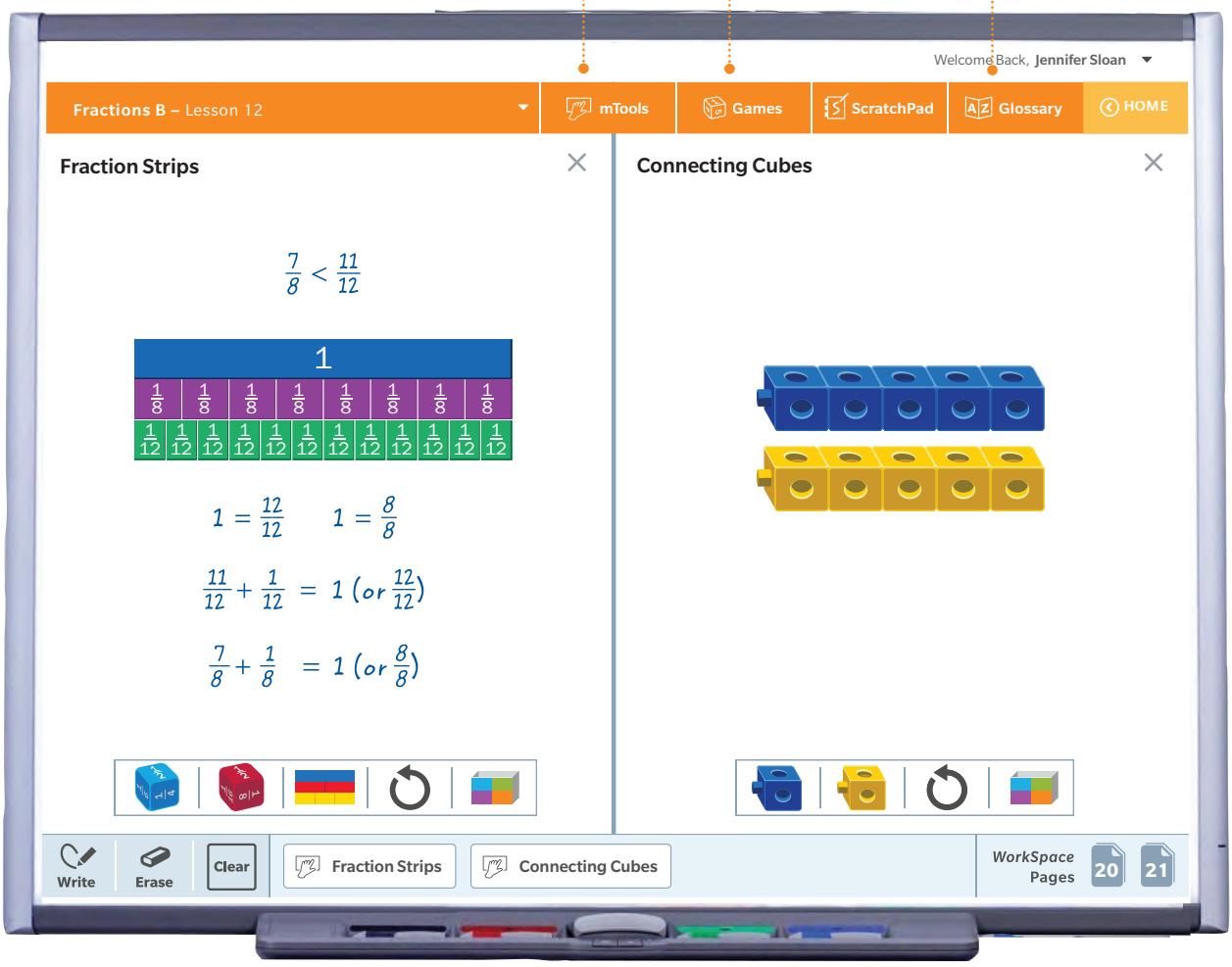


▲ **PROGRESS MONITOR**
Includes tools plus access to the ***Progress Space*** helps teachers identify precisely where students need support in order to accelerate.

mTools offer interactive visual models of the concrete manipulative materials.

Games allow teachers to model how to play with a partner or small group.

A **Glossary** displays definitions and examples.



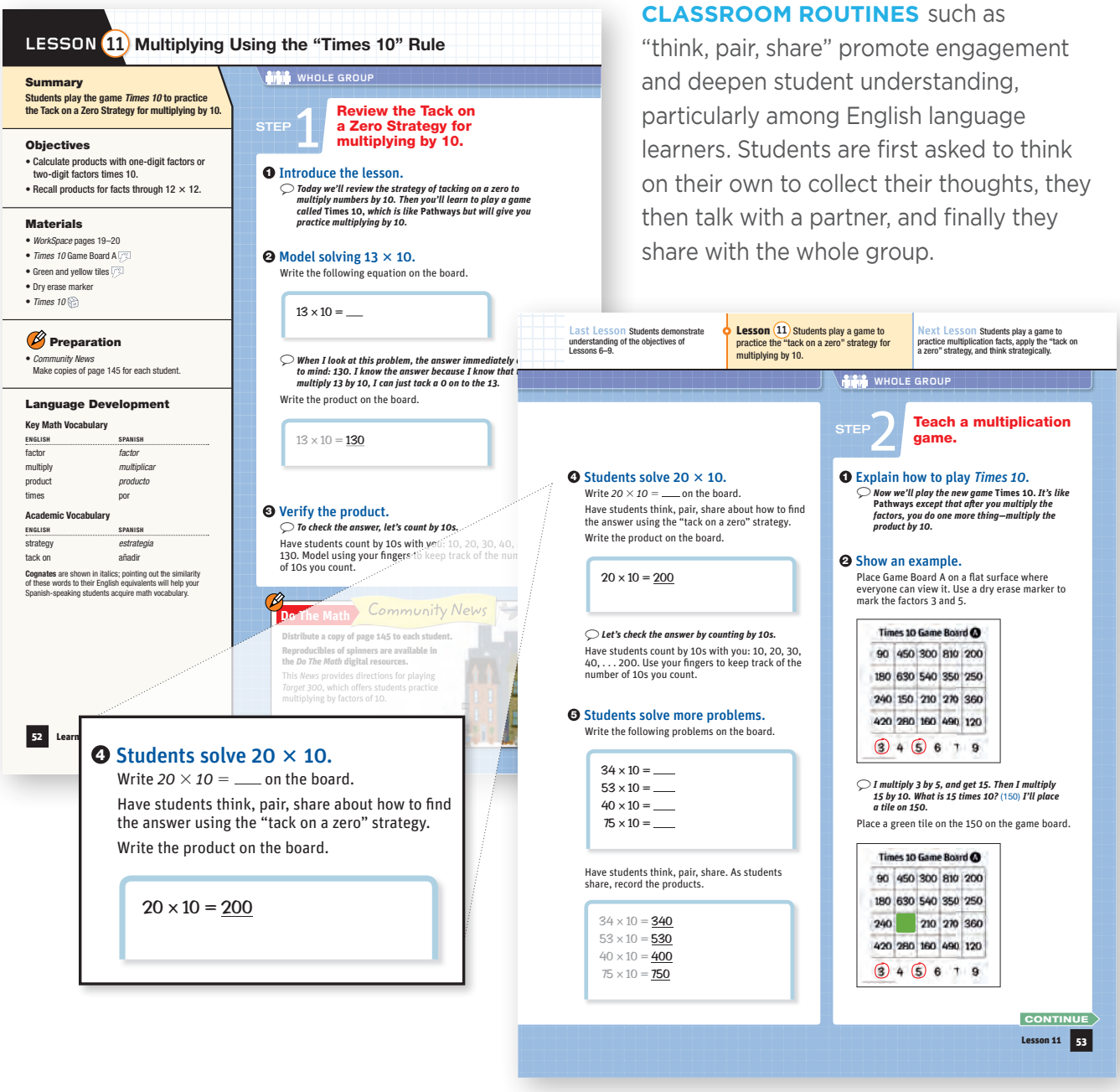
INTEGRATE TECHNOLOGY WITH YOUR INSTRUCTION

Do The Math's interactive whiteboard tools allow teachers to model the mathematics manageably for a large group and bring students up to the board to demonstrate and play games.

Corresponding ***WorkSpace pages*** are provided for each lesson.

STUDENT ENGAGEMENT

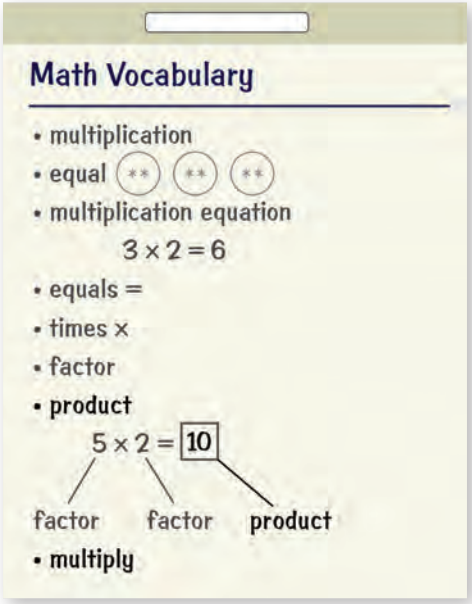
Do The Math was designed to build students' mathematical understanding and reasoning with materials and hands-on learning designed to encourage engagement and communication.



CLASSROOM ROUTINES such as "think, pair, share" promote engagement and deepen student understanding, particularly among English language learners. Students are first asked to think on their own to collect their thoughts, they then talk with a partner, and finally they share with the whole group.

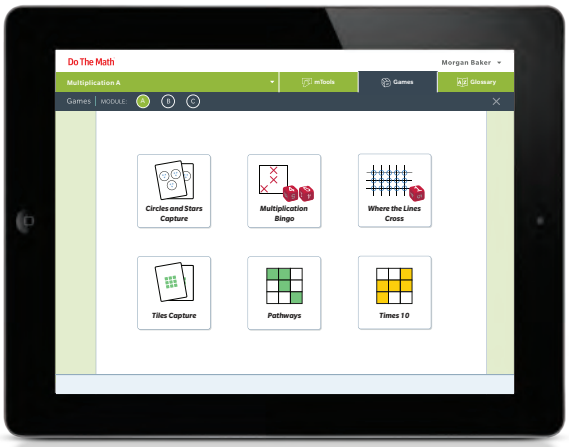
INDEPENDENT STUDENT WORK through regular assignments provides students with opportunities to practice, strengthen, and extend their learning. Students may work on assignments in pairs for additional learning support or by themselves so the teacher can assess and monitor individual progress. Engaging partner games are also effective ways for providing additional practice.

VOCABULARY AND LANGUAGE instruction helps students communicate effectively about the math they are learning. Vocabulary is explicitly taught in the context of a learning activity and then used consistently. For example, a Math Vocabulary chart is a useful class reference that students can also use as they create their own lists of mathematical words they've learned.



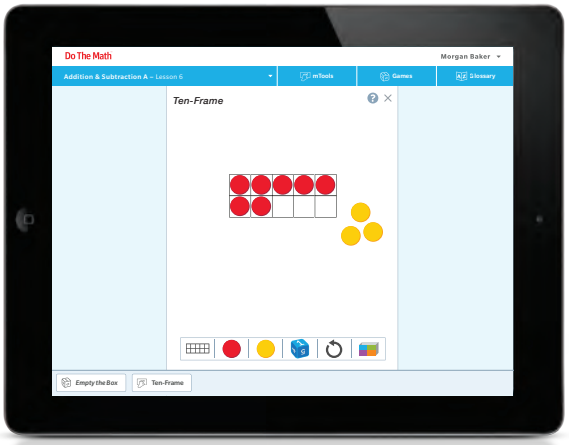
STUDENT DIGITAL TOOLS MOTIVATE AND EXCITE

All of your students' favorite games and hands-on materials are now available on tablets to provide additional practice in school or at home.



ENGAGE & PRACTICE

Students choose between a menu of partner games for each module.



BUILDING UNDERSTANDING

Students can use the interactive visual models and mTools to explore concepts and build understanding.

EXTEND LEARNING

To encourage learning, the *Do The Math* Student App is available anywhere with an Internet connection.

"I give the games a 10 out of 10. They're cool, fun, and helpful."

— FOURTH-GRADE STUDENT, SAN FRANCISCO

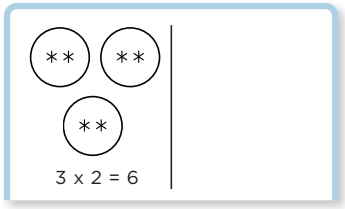
SUPPORTING LANGUAGE DEVELOPMENT

Do The Math was designed to provide maximum access for English language learners. Recognizing that struggling math students may actually be struggling with language, *Do The Math* heavily emphasizes language development, incorporates visual representations, and utilizes consistent instructional routines.

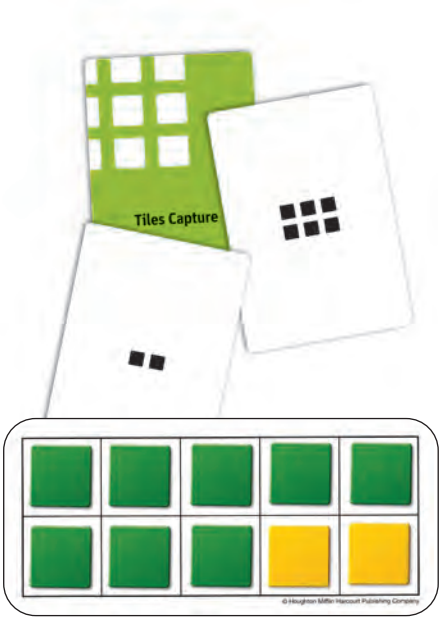
CONCRETE & VISUAL TOOLS SUPPORT UNDERSTANDING

Lessons integrate multiple visual representations of key math concepts.

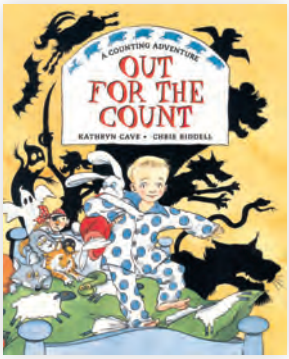
Visual representations of mathematical concepts are embedded throughout the program and are consistently used throughout student work.



Hands-on materials help students build understanding and practice skills.

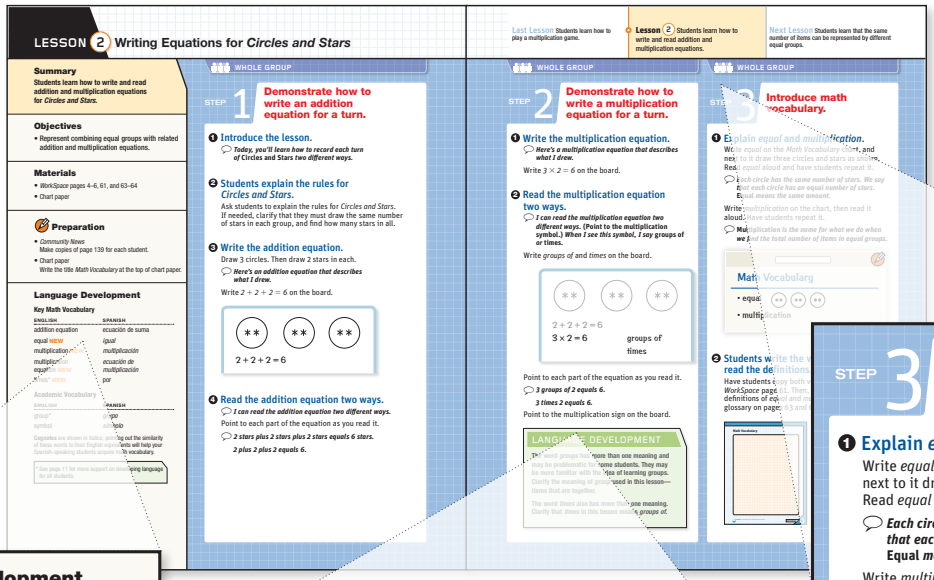


Children's literature is incorporated into each module to provide an engaging springboard for instruction.



SUPPORT FOR DEVELOPING LANGUAGE

Math vocabulary is explicitly taught, using a consistent routine. First, students experience the math concept. Next, students are formally introduced to a routine to see it, hear it, say it, write it, and read it. Then, throughout the rest of the lessons, opportunities are built in for receptive and expressive use of vocabulary. Linking learning experiences to mathematical representations and language supports language development.



Language Development

Key Math Vocabulary

ENGLISH	SPANISH
addition equation	ecuación de suma
equal NEW	*igual*
multiplication NEW	*multiplicación*
multiplication equation NEW	*ecuación de multiplicación*
times* NEW	por

Academic Vocabulary

ENGLISH	SPANISH
group*	*grupo*
symbol	*símbolo*

Cognates are shown in italics; pointing out the similarity of these words to their English equivalents will help your Spanish-speaking students acquire math vocabulary.

* See page 11 for more support on developing language for all students.

The sidebar for every lesson highlights the key math vocabulary and academic vocabulary embedded in the lesson. The vocabulary is translated into Spanish.

LANGUAGE DEVELOPMENT

The word *groups* has more than one meaning and may be problematic for some students. They may be more familiar with the idea of learning groups. Clarify the meaning of *group* used in this lesson—items that are together.

The word *times* also has more than one meaning. Clarify that *times* in this lesson means *groups of*.

Language Development boxes presented at point-of-use within the lesson provide instructional support.

STEP 3 Introduce math vocabulary.

❶ Explain *equal* and *multiplication*.

Write *equal* on the *Math Vocabulary* chart, and next to it draw three circles and stars as shown. Read *equal* aloud and have students repeat it.

💬 ***Each circle has the same number of stars. We say that each circle has an* equal *number of stars. Equal means the same amount.***

Write *multiplication* on the chart, then read it aloud. Have students repeat it.

💬 **Multiplication *is the name for what we do when we find the total number of items in equal groups.***

Math Vocabulary
- equal
- multiplication

❷ Students write the vocabulary and read the definitions.

Have students copy both vocabulary words onto *WorkSpace* page 61. Then, have them read the definitions of *equal* and *multiplication* in the glossary on pages 63 and 64.

Specific instructional directions help the teacher explicitly introduce vocabulary.

COAST TO COAST, THE **RESULTS** ARE IN!

MAKING WAVES IN SAN DIEGO

In Grade 3 at Carrillo Elementary School in San Diego, CA, 79% of English learners and 85% of economically disadvantaged students received a score of proficient or above on California Standard Test (CST) mathematics!

BIG GAINS IN THE BIG APPLE

In a study conducted across six New York City schools, third- through sixth-grade students from diverse populations, including special education, English language learners, and general education students made significant gains in multiplication from pretest to posttest, in just four short months!

Do The Math
Created by Marilyn Burns

Do The Math research demonstrates positive results for students who struggle with math and for the dedicated teachers who support them.

RISING STARS IN THE SUNSHINE STATE

A study conducted among third- to fifth- grade students in the Miami-Dade County Public School District showed that more than 80% of *Do The Math* students demonstrated significant growth on Florida's Comprehensive Assessment Test (FCAT) for mathematics!

SCHOOLS NATIONWIDE ARE SEEING RESULTS AND YOU CAN, TOO!

Call our Math Experts at **800.225.5800** or visit heinemann.com/DoTheMath to learn more about *Do The Math*.

Praise for *Do The Math*

I love the lessons because they are so laid out. They tell you what to do, they tell you what you need—they are smart. You can tell someone sat down and actually *thought* about the curriculum."

— LISA ALLEY, SECOND-GRADE TEACHER

Do The Math®
Created by Marilyn Burns

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Heinemann
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