

**S**trategies  
**T**o  
**A**chieve  
**M**athematics  
**S**uccess



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# CAMS<sup>®</sup> and STAMS<sup>®</sup> Program Overview

The CAMS<sup>®</sup> and STAMS<sup>®</sup> program is a powerful integrated program of assessment and data-driven instruction. The program focuses on the critical math concepts and skills that students need to advance to the next grade level. The CAMS<sup>®</sup> Series and the STAMS<sup>®</sup> Series work together effectively to ensure that your students gain a solid understanding of the key math concepts and skills. This knowledge will ultimately help them become independent problem solvers and succeed on high-stakes state tests.

## Features

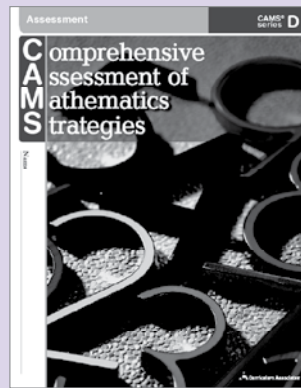
**Data-driven instruction with a pretest, a post test, and benchmarks**  
(see page 8)

**Emphasis on errors as opportunities for learning**  
(see pages 19 and 23)

**Highly scaffolded lessons with gradual release of responsibility**  
(see pages 14–25)

**Embedded professional development in supportive easy-to-use teacher guide**  
(see pages 14–25)

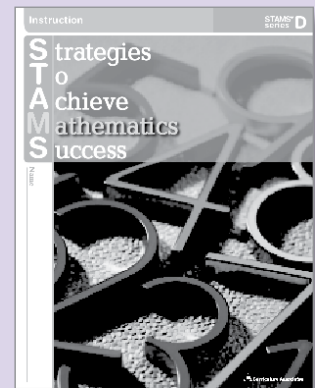
**Interactive Whiteboard Lessons to enhance instruction**  
(see pages 11 and 15)



**Books C–H  
(Grades 3–8)**

### Assessment

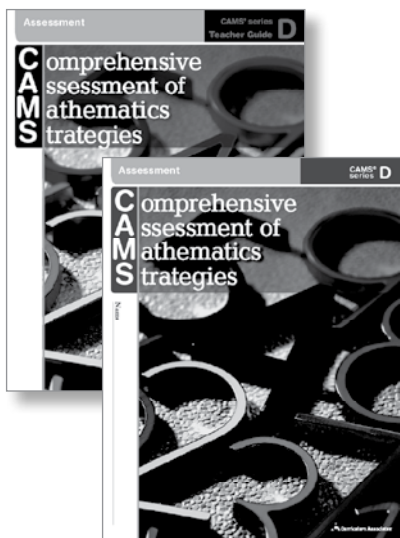
Use the CAMS<sup>®</sup> *Assessment Series* to gather information for targeting instruction and measuring progress.



**Books C–H  
(Grades 3–8)**

### Instruction

Use the STAMS<sup>®</sup> *Instruction Series*, with Interactive Whiteboard Lessons, for in-depth teaching of the 16 concepts and skills that will help students succeed at grade level.



## Assessment with CAMS® Series

Quickly identify which of the 16 foundational math concepts and skills your students find most difficult and use the results to monitor progress.

- A pretest diagnoses students' strengths and weaknesses and guides their placement in the *STAMS® Instruction Series*.
- Four benchmarks assess class progress throughout the year.
- A post test assesses students' mastery of concepts and skills following instruction with the *STAMS® Series*.
- Tracking forms and charts facilitate data collection and student self-assessment encourages reflection.



## Instruction with STAMS® Series

Provide students with explicit instruction of the 16 foundational math concepts and skills—those topics identified as the most important instructional goals for each grade level.

### Student Book

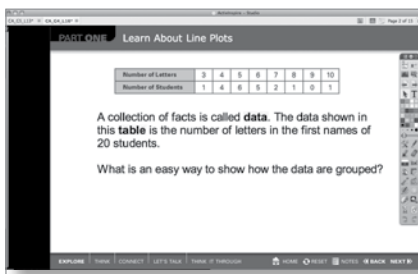
Designed for the struggling student, lessons are highly visual, engaging, and clearly presented. Each five-part lesson uses three levels of scaffolding to make sure students master the critical math concepts and skills.

1. *Scaffolded student support*—Instructional support is removed gradually to build student independence as they move through each lesson.
2. *Scaffolded student accountability*—Practice problems build student accountability by requiring students to use increasing degrees of higher-level thinking to analyze and explain their answers.
3. *Scaffolded problem-solving experience*—Practice problems slowly increase in difficulty to build student proficiency and confidence.

### Teacher Guide

Step-by-step support helps teachers easily differentiate instruction and present each lesson most effectively.

- Modeling helps teachers introduce each skill simply and confidently.
- Useful tips and embedded professional development guide instruction.
- Detailed easy-to-follow instructions minimize planning time.



### Interactive Whiteboard Lessons

Optional Interactive Whiteboard Lessons with manipulable models enhance instruction. They can be used to preview lessons or review previous lessons from any level.

# Getting Started

## 1 Diagnose with CAMS® Pretest

- Use the *CAMS*® Pretest, a comprehensive diagnostic test, to place students in the *STAMS*® *Series*. Pretest questions correspond to each of the 16 *STAMS*® lessons so results clearly identify which topics students need to study.
- Administer the Pretest on five successive days, prior to presenting corresponding *STAMS*® lessons. See the *CAMS*® teacher guide for more details.

## 2 Instruct with STAMS® Lessons

- Pinpoint specific lessons in the *STAMS*® student book to remediate particular areas that need improvement or reinforcement.
- Alternatively, have students complete all of the lessons in the *STAMS*® student book to build and reinforce grade-level foundational math concepts and skills.

## 3 Monitor Progress with Benchmarks

- Assess progress in all 16 foundational topics with the four 16-item *CAMS*® Benchmarks.
- Monitor students' progress at four points during the year. See the Pacing Chart to the right for suggested intervals.
- Record and analyze mastery levels with class tracking charts in the *CAMS*® teacher guide.

## 4 Assess Mastery with CAMS® Post Test

- Use the *CAMS*® Post Test to assess students' mastery of each of the 16 math concepts and skills taught in the *STAMS*® *Series*.
- Administer the Post Test on five successive days, following instruction of all 16 *STAMS*® lessons.

### Suggested Pacing Chart for Book D of the CAMS® and STAMS® Program

Day(s)	Lesson	<i>CAMS</i> ® Assessment Series	<i>STAMS</i> ® Instruction Series	Minutes
1–5		<i>CAMS</i> ® Pretest		30–45/day
6–10	1	Multiplication Properties		30–45/day
11–15	2	Multiply Mentally		30–45/day
16–20	3	Multiply by 1-Digit Numbers		30–45/day
21–25	4	Multiply by 2-Digit Numbers		30–45/day
26		<i>CAMS</i> ® Benchmark 1		30–45
27–31	5	Relate Division to Multiplication		30–45/day
32–36	6	Divide Without Regrouping		30–45/day
37–41	7	Divide with Regrouping		30–45/day
42–46	8	Equivalent Fractions		30–45/day
47		<i>CAMS</i> ® Benchmark 2		30–45
48–52	9	Simplify Fractions		30–45/day
53–57	10	Decimal Place Value		30–45/day
58–62	11	Compare and Order Decimals		30–45/day
63–67	12	Relate Decimals to Fractions		30–45/day
68		<i>CAMS</i> ® Benchmark 3		30–45
69–73	13	Angles		30–45/day
74–78	14	Understand Area		30–45/day
79–83	15	Area of Rectangles		30–45/day
84–88	16	Line Plots		30–45/day
89		<i>CAMS</i> ® Benchmark 4		30–45
90–94		<i>CAMS</i> ® Post Test		30–45/day

**Note:** Allocate 19 weeks for full implementation of the *CAMS*® and *STAMS*® program, with each lesson spanning 5 school days.

# CAMS<sup>®</sup> and STAMS<sup>®</sup> Grade-Level Foundational Skills

All 16 concepts and skills covered in each level of the *STAMS<sup>®</sup> Series* align to NCTM Focal Points and Connections for that grade. Lesson topics have been carefully sequenced so students move from basic skills to more complex content within each grade and between grades as well.

The focus of the *STAMS<sup>®</sup> Series* progresses from number sense and computational skills in early grades to pre-algebra in later grades.

Additional lessons included to address Common Core State Standards.  
See Table of Contents.

## Book C (Grade 3)

Place Value  
Add and Subtract  
Multiplication Concepts  
Fact Strategies  
More Fact Strategies  
Division Concepts  
Fact Families  
Fraction Concepts  
Model Equivalent Fractions  
Benchmark Fractions  
Comparing Fractions  
Fractions Greater Than 1  
Plane Figures  
Length  
Perimeter  
Pictographs and Bar Graphs

## Book D (Grade 4)

Multiplication Properties  
Multiply Mentally  
Multiply by 1-Digit Numbers  
Multiply by 2-Digit Numbers  
Relate Division to Multiplication  
Divide Without Regrouping  
Divide with Regrouping  
Equivalent Fractions  
Simplify Fractions  
Decimal Place Value  
Compare and Order Decimals  
Relate Decimals to Fractions  
Angles  
Understand Area  
Area of Rectangles  
Line Plots

## Book E (Grade 5)

Multiply 3-Digit Numbers  
Divide Mentally  
Estimate Quotients  
1-Digit Divisors  
Zeros in the Quotient  
2-Digit Divisors  
Understand Mixed Numbers  
Add and Subtract Like Fractions  
Compare Unlike Fractions  
Add and Subtract Unlike Fractions  
Add and Subtract Mixed Numbers  
Add and Subtract Decimals  
Area  
Surface Area  
Understand Volume  
Line Graphs

## Book F (Grade 6)

Multiply Whole Numbers by Fractions  
Multiply Fractions  
Divide Whole Numbers by Fractions  
Divide Fractions by Fractions  
Multiply and Divide by Powers of Ten  
Multiply Decimals  
Divide Decimals by Whole Numbers  
Divide by Decimals  
Understand Ratios  
Understand Percent  
Unit Rates  
Ratios in Tables of Data  
Solve Equations Using Number Sense  
Solve Equations Using Inverse Operations  
Use Formulas  
Volume

## Book G (Grade 7)

Understand Integers  
Add and Subtract Integers  
Multiply and Divide Integers  
Evaluate Expressions  
Solve Linear Equations  
Equations with Rational Numbers  
Proportional Relationships  
Solve Proportions  
Rate Problems  
Percent as a Ratio  
Percent Problems  
Similarity  
Circles  
Cylinders  
Circle Graphs  
Theoretical Probability

## Book H (Grade 8)

Exponents  
Square Roots  
Solve Two-Step Equations  
Two-Step Equations with Rational Numbers  
Linear and Nonlinear Equations  
Slope  
Graph Linear Equations  
Solve Systems Graphically  
Solve Systems Algebraically  
Special Pairs of Angles  
Angle Sums  
Triangle Similarity  
Pythagorean Theorem  
Distance Formula  
Mean, Median, Range  
Scatter Plots



# STAMS® Instruction Overview

Each level of the *STAMS® Series* has 16 interrelated lessons designed to help students build mathematical competency. Emphasizing depth over breadth, each five-day, five-part lesson targets two closely-related aspects of a single concept or skill. Highly scaffolded lessons offer gradual release of responsibility from the teacher to the student. Part One and Part Two introduce the skill with modeled and guided instruction. Part Three and Part Four (modeled and guided practice) and Part Five (independent practice) have students work with growing accountability for their learning as they practice and apply the skills taught.

*STAMS®* lessons are optimally designed to be used in conjunction with the *CAMS®* assessments, as described on page 9. (See the *CAMS®* teacher guide for more detail.) However, teachers have found that the built-in flexibility also makes *STAMS®* lessons perfect for a variety of other uses.

## Alternative Implementations

Other scenarios for using the *STAMS®* lessons with your class include the following:

### Whole Group (at grade level)

*State test review*—Use the *STAMS®* lessons as a review for the entire class. The 16 weeks of lessons allow you to finish well before your state test date.

### Small Group (at or below grade level)

*Reteaching support*—Use the *STAMS®* lessons with small groups to reteach skills that students are still struggling to master. See pages 12–13 for more information.


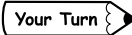

### Individual (at or below grade level)

*Tutoring or independent work*—As you become aware of specific gaps in a student’s background knowledge, assign the corresponding *STAMS®* lesson.

**Tip:** *STAMS®* lessons are best used with teacher guidance, as students learn best when they are directed by knowledgeable, supportive teachers. However, the student book lessons are written to be inviting and accessible even to struggling students. If you do assign *STAMS®* lessons as independent class work, be sure to circulate and monitor students as they work.

## Week at a Glance

### Suggested Lesson Pacing

	Monday	Tuesday
	modeled and guided instruction	
	Part One	Part Two
<b>Direct instruction</b>  Interactive Whiteboard (IWB) <i>(optional)</i> 	Introduce new skill with student book pages. <b>20 minutes</b>  Use IWB Lesson in place of Part One in student book.	Introduce new skill with student book pages. <b>20 minutes</b>  Use IWB Lesson in place of Part Two in student book.
<b>Independent work</b> 	Practice new skill.  <b>10 minutes</b>	Practice new skill.  <b>10 minutes</b>
<b>Assessment</b> 	Check <i>Your Turn</i> answer.	Check <i>Your Turn</i> answer.
<b>Additional Activity</b> <i>(optional)</i>	<i>Hands-on Activity</i>  <b>15 minutes</b>	<i>Reteaching Activity</i>  <b>15 minutes</b>



To download your  
**Interactive Whiteboard Lessons**  
and a User Guide, go to  
[CurriculumAssociates.com/STAMS/IWB](http://CurriculumAssociates.com/STAMS/IWB).

Use the password STAMSIWB  
to access your grade-level lessons.  
Promethean software is required to present  
these lessons. A free download of ActivInspire  
Personal Edition is available at  
<http://support.prometheanplanet.com>.

## Additional Instruction

### Interactive Whiteboard (IWB) Lessons

Interactive Whiteboard Lessons are available for each lesson in the student book. The IWB Lessons offer students opportunities to question and explore mathematical concepts in greater depth.

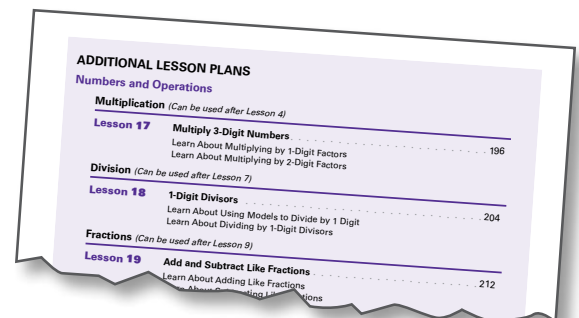
- IWB Lessons can be used to supplement instruction in Part One and Part Two of each lesson.
- IWB Lessons can also recap and review previous lessons from any level before beginning instruction.
- Features, such as cloning and dragging objects, and whiteboard tools, such as highlighters, keep students actively engaged in learning.
- Teacher notes lead you through the modeled and guided instruction to maximize each lesson's instructional impact.
- For additional Interactive Whiteboard tips, see page 15.

### Additional Common Core Lessons

The Common Core State Standards for Mathematics presents some math concepts and skills at different grade levels than the NCTM Focal Points and state standards have recommended. To address that discrepancy in grade-level content and anticipated differences in schools' timelines for implementing the Common Core State Standards (CCSS), the *STAMS® Series* offers Additional Lessons at the back of each book, C–G.

- Additional Lessons for CCSS are organized and labeled in the same topic groupings as the 16 foundational grade-level lessons.
- Refer to the Table of Contents for when to use each Additional Lesson. (Or you may wish to postpone those lessons until later in the year, after your state assessments are completed.)

Wednesday	Thursday	Friday
modeled and guided practice		independent practice
Part Three	Part Four	Part Five
Model multiple-choice problem; analyze answers. <b>10 minutes</b>	Model extended-response problem. <b>10 minutes</b>	
Review Parts One and Two as necessary.	Review Parts One and Two as necessary.	
Practice solving multiple-choice problems. <b>20 minutes</b>	Practice solving extended-response problem. <b>20 minutes</b>	Solve problems in test-prep format. <b>30 minutes</b>
Check <i>Your Turn</i> answers.	Check <i>Your Turn</i> answer.	Check <i>Your Turn</i> answers. <i>Use Assessment and Remediation.</i> <b>15 minutes</b>
<i>Vocabulary Activity</i> <b>15 minutes</b>	<i>Real-World Connection plus School-Home Connection</i> <b>15 minutes</b>	<i>Challenge Activity</i> <b>15 minutes</b>



## Using STAMS® Lesson Features for Differentiation

STAMS® lessons support several approaches to differentiated instruction. Work with small groups or individuals as needed by taking advantage of these lesson features.

### Knowing how and when to differentiate

Effective differentiation is based on identifying where students are struggling. The ongoing assessment features help you stay informed about student progress.

- Observe student work with *Your Turn* on a daily basis to see which students are off track.
- Use *Error Alerts* to help recognize and correct common mistakes and misconceptions as soon as they surface.
- Use Assessment and Remediation to identify misconceptions or gaps in understanding at any point in the lesson. The activities listed can provide individual or small-group remediation (see page 23).

### For ELL students

- For any students who struggle with the language of math, preview math vocabulary (see page 15).
- Throughout the instruction, refer to *ELL Support* tips that alert you to potential language obstacles.
- Use the *Vocabulary Activity* to help students tie new math terms to words they already understand.

### For struggling students

- Use the *Hands-on Activity*, *Reteaching Activity*, and *Real-World Connection* to give students other ways to access the skill.
- Review concepts visually with Interactive Whiteboard Lessons.

### For confident students

- Provide students an opportunity to extend their understanding of the concepts in the lesson with the *Challenge Activity*.

**Modeled Instruction**

**PROB 190** Learn More About Multiplying Two 2-Digit Numbers

How can you find the product of two 2-digit numbers more quickly?

**EXPLORE** You know a quick way to multiply a 2-digit number by a 1-digit number. Regroup the 20 in 2 tens and 0 ones. What is the product?

**THINK** Multiply the tens,  $4 \times 2$  tens = 8 tens. Add the ones,  $0 + 0$  ones = 0 ones. What is the product? What is a quick way to multiply a 2-digit number by a 2-digit number?

**ACT 190** 156  
 $16 \times 10$  tens and ones,  $16 \times 1$  ones = 16  
 $16 \times 10$  tens and ones,  $16 \times 1$  ones = 16

**THINK** To find  $16 \times 16$ , you can use base blocks.

**EXPLORE** Multiply  $16 \times 16$ . Regroup as 1 ten 1 one. Write the product. What is the product?  $16 \times 16 = 256$

**THINK** Multiply  $20 \times 16$ . Write the product. What is the product?  $20 \times 16 = 320$

**THINK** Add the partial products. The product of  $16 \times 16$  is 256.

**ACT 190** Explain how you used the problem 161 to check that your answer to 161 is 256 is correct.

**AT A GLANCE**

Students learn a quicker algorithm for recording partial products when multiplying two 2-digit numbers.

**STEP BY STEP**

**Page 36**

- Introduce the **Question** at the top of the page.
- Read **Explore** with students. Point out how the partial products are recorded as one number.

**ELL Support:** Point out that in everyday use, *regroup* can mean to “to arrange people or things in new groups.” When you regroup in multiplication, you arrange 10 ones as 1 ten or 10 tens as 1 hundred.

- Read **Think** with students.
- Tell students to study each step in **Connect**. Make sure students understand that the first partial product comes from multiplying  $6 \times 53$  and the second from multiplying  $20 \times 53$ .

**ADDITIONAL ACTIVITIES**

**Hands-on Activity**  
 Use base-ten blocks to model multiplication.

**Materials:** base-ten blocks

Organize students in small groups and distribute hundreds, tens, and ones base-ten blocks. Help students use the base-ten blocks to model  $16 \times 23$ . Have them place 1 ten and 6 ones blocks in a column to show 16. Then have them place 2 tens blocks and 3 ones blocks in a row to show 23. Tell students to use hundreds, tens, and ones blocks to “fill in” the model as shown. Have students count the blocks they filled in to find the total. (368) Ask, “What are the partial products of  $16 \times 23$ ?” ( $3 \times 6, 3 \times 10, 20 \times 6, 20 \times 10$ ) Then help students understand how the array shows the products.

**Real-World Connection**  
 Identify everyday examples of multiplication.

Find out what students know about ferries. Explain that to find out how many people or cars a ferry can hold during its number of runs each day, you might multiply two 2-digit numbers. Give students problems such as: “A ferry makes 15 trips each day. The ferry can hold 48 cars. How many cars can the ferry hold each day?” (720 cars) Encourage students to come up with problems of their own.

**School-Home Connection**  
 Inform families about multiplication.

Give each student a copy of the reproducible School-Home Connection for Lesson 4 (page 169) to share with the family. The activity included in the letter has the family use multiplication to find how many times something happens in 15 minutes.

**Challenge Activity**  
 Find a certain product.

Have students work in pairs or small groups to find the product of two 2-digit factors given certain conditions. It might be a problem in which

- regrouping is not required
- there is at least 1 zero in the product
- regrouping in the tens and hundreds is required
- regrouping is required when the partial products are added

**Vocabulary Activity**  
 Play “Memory Match” to reinforce terms.

**Materials:** index cards

In pairs, have students write one vocabulary term on each index card. Then have students write a definition or example of each term on another index card. Students place the cards face down in separate rows, one for the word cards and one for the definition/example cards. Students take turns flipping over a card from each group. The player keeps the pair if the cards match, and replaces them if not. The player with the most matched pairs wins.

Number and Operations

Multiply by 2-Digit Numbers 65

**ADDITIONAL ACTIVITY**  
 See Reteaching Activity (page 65).

Number and Operations

## Using Related STAMS® Lessons to Remediate

STAMS® lessons are sequenced within each grade, and from grade to grade, to make instruction easy at the appropriate level. For any particular topic, use the Related STAMS® Lessons feature in the teacher guide to find a lesson, from the same grade level or from an earlier grade, that meets the student’s needs.

### Review within the grade level

- If a student isn’t succeeding with a lesson, your first resource is reviewing prerequisite skills in related lessons in the same book. In most cases these skills were taught in an earlier lesson.
- A careful review of Part One and Part Two of Related STAMS® Lessons can help a student quickly get back on track.

### Review at a lower grade level

- Sometimes lessons cover prerequisite skills from a previous grade’s book.
- Again, a review of Part One and Part Two of Related STAMS® Lessons can help a student quickly get back on track.
- A student who frequently needs to review material from a previous level may need consistent instruction at that level before that student can succeed in the core program at grade level.
- Consider administering the CAMS® Pretest from the previous level. These results will help you place the student more appropriately.

To review skills from related lessons, you might:

- Use the corresponding Interactive Whiteboard Lessons and review only Part One and Part Two.
- Use the appropriate student book lesson and work with the student through either Part One and Part Two, or all five parts.

... be able to:  
 ... a 1-digit number by a 2-digit number.  
 ... group ones as tens and tens as hundreds.  
 ... Multiply by multiples of 10.

**RELATED STAMS® LESSONS**

- **Book D – Lesson 2**  
*Multiply Mentally* teaches how to multiply by multiples of 10.
- **Book D – Lesson 3**  
*Multiply by 1-Digit Numbers* teaches how to multiply a 2-digit number by a 1-digit number.

**VOCABULARY**

**Lesson 4** MULTIPLY BY 2-DIGIT NUMBERS

**Multiplication**

**LESSON OBJECTIVES**  
 Students will:

- Use place value and partial products to multiply two 2-digit numbers.
- Learn a quicker algorithm for recording the partial products when multiplying two 2-digit numbers.

**PREREQUISITES**  
 Students should be able to:

- Multiply a 1-digit number by a 2-digit number.
- Regroup ones as tens and tens as hundreds.
- Multiply by multiples of 10.

**RELATED STAMS® LESSONS**

... D – Lesson 2  
*Multiply Mentally* teaches how to multiply by multiples of 10.

... Lesson 3  
*Multiply by 1-Digit Numbers* teaches how to multiply a 2-digit number by a 1-digit number.

**VOCABULARY**

**MATH BACKGROUND**  
 Lesson 3 and this lesson both show how to multiply numbers, first showing partial products explicitly, and then showing the standard algorithm, in which partial products are not explicitly shown.

The conceptual basis for both lessons is the distributive property, which states that for any numbers  $a$ ,  $b$ , and  $c$ ,  $a(b + c) = ab + ac$  and  $(a + b)c = ac + bc$ .

Multiplying a 2-digit number by a 1-digit number:  
 $8 \times 56 = 8 \times (50 + 6) = 8 \times 50 + 8 \times 6$   
 $a(b + c) = ab + ac$

For multiplying two 2-digit numbers, the distributive property is used three times.  
 $24 \times 31 = (20 + 4) \times (30 + 1)$   
 $= \underbrace{20 \times (30 + 1)}_2 + \underbrace{4 \times (30 + 1)}_3$   
 $= \underbrace{20 \times 30 + 20 \times 1}_2 + \underbrace{4 \times 30 + 4 \times 1}_3$

This 12-page section guides teachers through a sample lesson plan from the *STAMS*® teacher guide, which shows facsimiles of the student book lesson. Numbered boxes call out and describe the key features in both the teacher guide and student book.

## INTRODUCTION

### Lesson 4 MULTIPLY BY 2-DIGIT NUMBERS

**1 LESSON OBJECTIVES**

Students will:

- Use place value and partial products to multiply two 2-digit numbers.
- Learn a quicker algorithm for recording the partial products when multiplying two 2-digit numbers.

**2 PREREQUISITES**

Students should be able to:

- Multiply a 1-digit number by a 2-digit number.
- Regroup ones as tens and tens as hundreds.
- Multiply by multiples of 10.

**3 RELATED STAMS® LESSONS**

- **Book D – Lesson 2**  
*Multiply Mentally* teaches how to multiply by multiples of 10.
- **Book D – Lesson 3**  
*Multiply by 1-Digit Numbers* teaches how to multiply a 2-digit number by a 1-digit number.

**4 VOCABULARY**

**PAGE 34**

- **place value:** the value of a digit depending on its place in a number
- **partial product:** the result of multiplying a digit of one factor by one or more digits of another factor
- **product:** the result of multiplying numbers together

**PAGE 36**

- **regroup:** to use place value to trade amounts of equal value, such as ones for tens or tens for ones

**5 MATH BACKGROUND**

Lesson 3 and this lesson both show how to multiply numbers, first showing partial products explicitly, and then showing the standard algorithm, in which partial products are not explicitly shown.

The conceptual basis for both lessons is the distributive property, which states that for any numbers  $a$ ,  $b$ , and  $c$ ,  $a(b + c) = ab + ac$  and  $(a + b)c = ac + bc$ .

Multiplying a 2-digit number by a 1-digit number:

$$8 \times 56 = 8 \times (50 + 6) = 8 \times 50 + 8 \times 6$$

$$a(b + c) = ab + ac$$

For multiplying two 2-digit numbers, the distributive property is used three times.

$$24 \times 31 = (20 + 4) \times (30 + 1)$$

$$= \boxed{20 \times (30 + 1)} + 4 \times \boxed{(30 + 1)}^1$$

$$= \boxed{20 \times 30 + 20 \times 1} + \boxed{4 \times 30 + 4 \times 1}$$

2
3

**6 Interactive Whiteboard**

**Visualize Multiplying by a 2-Digit Number**

Go to the *Interactive Whiteboard Lessons* to bring Parts One and Two to life. Use features such as drag and drop to deepen students' understanding of multiplying by a 2-digit number.

**58** Multiply by 2-Digit Numbers

Number and Operations

## Best Practices

### Math Vocabulary

Knowledge of math terminology is critical to students' understanding of new concepts and skills. To master math vocabulary, students must see and use the words in context frequently, both orally and in writing.

- As students encounter new terms in text, model the correct pronunciation of each word and have students repeat the word.
- Model the correct use of math terms as you present each lesson.
- Suggest that students highlight or underline new vocabulary as they encounter it.
- Ask students to state or write the definition in their own words and/or use the word in context.
- Encourage students to use math terms whenever they are communicating their ideas about math.

1

**Lesson Objectives:** Identifies skills-related goals for students.

2

**Prerequisites:** Lists critical concepts/skills required for success with the lesson.

3

**Related STAMS® Lessons:** Identifies precursor lessons that lay the foundation for the concepts/skills students are about to learn.

4

**Vocabulary:** Lists key math terms from the lesson, with definitions.

5

**Math Background:** Supports teacher understanding of why the lesson content is important for students to learn.

6

**Interactive Whiteboard:** Enhances instruction by turning the lesson into an engaging and visual experience.

#### Tips for using the Interactive Whiteboard Lessons:

- Click on and preview the teacher notes before teaching the lesson. Print out these notes for easy reference.
- Introduce the skills taught in Part One and Part Two with the Interactive Whiteboard Lessons. Have students follow along in their books so they will know where to find explanations and examples they may need to review later.
- Use the Interactive Whiteboard Lessons as a quick recap before Part Three and Part Four.
- Access Interactive Whiteboard Lessons from previous levels to quickly review topics in Related STAMS® Lessons.
- Encourage student participation. Allow plenty of time for students to use the interactive whiteboard features to work out problems.
- Rename, save, and print out the work done on the interactive whiteboard to share with students.

To download the Interactive Whiteboard Lessons and a User Guide, go to [CurriculumAssociates.com/STAMS/IWB](http://CurriculumAssociates.com/STAMS/IWB). Use the password STAMSIWB.

PART ONE

PART TWO

Modeled Instruction

Lesson 4 MULTIPLY BY 2-DIGIT NUMBERS

PART ONE: Learn About Multiplying Two 2-Digit Numbers

1

**Explore** How can you use place value to multiply a 1-digit number by a 2-digit number?

You can use place value to multiply a 1-digit number by a 2-digit number.  $56 \times 8 = 448$ . Multiply the ones,  $8 \times 6 = 48$ . Multiply the tens,  $8 \times 50 = 400$ . Add partial products.  $48 + 400 = 448$ .

2

**Think** Find  $31 \times 24$ .  
 $31 = 3$  tens and  $1$  one, or  $30 + 1$ .  
 $24 = 2$  tens and  $4$  ones, or  $20 + 4$ .

**Connect** To find  $31 \times 24$ , you can use these steps:

1. Multiply the ones and tens in 31 by the ones in 24.	2. Multiply the ones and tens in 31 by the tens in 24.	3. Add the partial products.
$31 \times 4 = 124$	$31 \times 20 = 620$	$31 \times 24 = 744$

The product of  $31 \times 24$  is 744.

3

**Let's Talk** When you multiply a 2-digit number by a 2-digit number, there are 4 partial products. Why do you think this is so?

Guided Instruction

4

**Think It Through**

Fill in the blanks. Solve the problem.  
 In Jack's class, there are 23 boxes of crayons. There are 36 crayons in each box. How many crayons are there in all?

23  $\times$  36 =  $\square$   
 ■ Multiply the ones and tens in 36 by the ones in 23.

$$\begin{array}{r} 36 \\ \times 23 \\ \hline 108 \\ 720 \\ \hline \end{array}$$

■ Multiply the ones and tens in 36 by the tens in 23.

$$\begin{array}{r} 36 \\ \times 23 \\ \hline 18 \\ 720 \\ \hline \end{array}$$

■ Add the partial products.

$$\begin{array}{r} 36 \\ \times 23 \\ \hline 18 \\ 720 \\ \hline 828 \end{array}$$

**Solution:** There are 828 crayons in all.

5

**Your Turn** Now, use what you know to solve this problem.

1. There are 13 bagels in a baker's dozen. How many bagels are there in 48 baker's dozens?

- A 264
- B 552
- C 524
- D 624

6 AT A GLANCE

Students activate their background knowledge of using place value to multiply a 1-digit number by a 2-digit number. Then they apply these principles to multiply two 2-digit numbers.

7 STEP BY STEP

PAGE 34

- Introduce the **Question** at the top of the page.
- Read aloud the steps shown in **Explore**.
- Read **Think** with students. Point out that 31 and 24 can be regrouped so they are easier to multiply.
- Discuss **Connect** with students. Make sure students can identify what was multiplied to get each partial product.

8

**ELL Support:** Remind students that *ones* refers to the digit in the ones place and *tens* refers to the digit in the tens place. Emphasize, for example, that *3 tens* is the same as *30*.

10

**Error Alert:** Students who choose A may have found  $10 \times 4$ , not  $10 \times 40$ .



ADDITIONAL ACTIVITY

See **Hands-on Activity** (page 65).

# Student Book

- 1 Focus Question:** Sets a purpose for student learning. Gets students thinking about the answer arrived at through Explore/Think/Connect.
- 2 Explore/Think/Connect:** Provide students with a proven routine to apply to all math problems. **Explore** activates students' prior knowledge and introduces the concept/skill. **Think** presents leading questions or statements to get students thinking about the concept/skill. **Connect** answers the focus question.
- 3 Let's Talk:** Develops students' ability to communicate effectively about math through an engaging peer-learning activity.
- 4 Think It Through:** Walks students through the thinking process for solving an example problem.
- 5 Your Turn:** Reinforces instruction with independent practice.

# Teacher Guide

- 6 At a Glance:** Sums up what students do in each lesson part.
- 7 Step by Step:** Provides an explicit walk-through of the steps for guiding students through each lesson part.
- 8 ELL Support:** Targets at point-of-use a language issue that may be affecting English language learners' ability to understand the math.
- 9 Tip:** Provides on-the-spot information the teacher can use to build students' understanding of the concept/skill.
- 10 Error Alert:** Addresses common errors or misconceptions that lead students to an incorrect answer.

## Modeled & Guided Instruction

### Teacher Led

After prompting students to tap into their prior knowledge, the teacher uses step-by-step examples to model the new concept/skill and guide instruction.

## Best Practices

### Think-Aloud

The ability to verbalize mathematical thinking and strategies to others strengthens conceptual understanding and problem-solving skills.

- To foster effective discussion, plan carefully when grouping students for Let's Talk. Consider skill levels, social skills, and English language proficiency.
- Circulate and provide tips or encouragement as students work together to discuss math ideas. Guide the discussion as needed.
- During Think It Through, allow students to work in pairs or groups and talk aloud as they follow the steps to solve the problem.



## COMPONENTS OF MATH INSTRUCTION

Math Strategies	Examples in STAMS® Series	Research Says
<p><b>Computational Fluency</b> Computational fluency is having quick recall of number facts and knowledge, and the ability to apply multiple computational methods.</p>	<p><b>Student Book</b> Problems in each lesson part reinforce grade appropriate methods for computing.</p>	<p>“Efficient, accurate computational fluency is key to students’ success in higher-level mathematics necessary for the workplace.” — <i>National Research Council, 2001</i></p>
<p><b>Conceptual Understanding</b> Conceptual understanding is the knowledge of why math processes and rules work.</p>	<p><b>Student Book</b> Students develop conceptual understanding in Part One and Part Two and demonstrate their knowledge in Part Three, Part Four, and Part Five.</p>	<p>“Students with conceptual understanding know more than isolated facts and methods. They understand why a mathematical idea is important and the kinds of context problem-solving in which it is useful.” — <i>National Research Council, 2001</i></p>
<p><b>Error Analysis</b> Error analysis is an explanation of the patterns of mistakes students make. It allows teachers to provide targeted instruction that will help correct the errors.</p>	<p><b>Student Book</b></p> <ul style="list-style-type: none"> <li>• Part Three: Check</li> </ul> <p><b>Teacher Guide</b></p> <ul style="list-style-type: none"> <li>• Part One and Part Two: Error Alert feature</li> <li>• Part Three: Answer Analysis</li> <li>• Assessment and Remediation chart</li> </ul>	<p>“Research has shown that building upon students’ prior knowledge and directly addressing misconceptions can lead to increased learning.” — <i>Swan, 2002; Askew, 2002</i></p>
<p><b>Math Vocabulary</b> Math vocabulary is the group of content-area words, or Tier 3 words, that are most often specific to math text and used rarely in other contexts.</p> <p><b>Controlled Vocabulary</b> Controlled vocabulary is the use of words at a lower reading level. It allows students to learn new concepts without struggling with reading issues.</p>	<p><b>Student Book</b></p> <ul style="list-style-type: none"> <li>• Students must use math language in their explanations for solving the extended-response problems in Part Four and Part Five.</li> <li>• Math vocabulary words are boldfaced.</li> <li>• Key terms are defined explicitly.</li> <li>• The Let’s Talk activities in Part One and Part Two provide opportunities for students to use math language in context.</li> <li>• Each lesson uses controlled vocabulary to make new math knowledge more accessible and understandable.</li> </ul> <p><b>Teacher Guide</b></p> <ul style="list-style-type: none"> <li>• Vocabulary Activity</li> <li>• Definitions of key math terms are provided for each lesson.</li> </ul>	<p>“Tier Three words should be taught at point of contact, or as they occur in text.” — <i>Beck, McKeown, &amp; Kagan, 2002</i></p> <p>“Without a basic knowledge of these terms, students will have difficulty understanding information they read or hear. Knowledge of important terms is critical to understanding any subject.” — <i>Marzano &amp; Pickering, 2005</i></p> <p>“Research has demonstrated that vocabulary learning occurs most successfully through instructional environments that are language-rich, actively involve students in using language, require that students both understand spoken or written words and also express that understanding orally and in writing, and require students to use words in multiple ways over extended periods of time.” — <i>CCSSO/NGA, 2010</i></p>

For a full report and bibliography, go to [CurriculumAssociates.com/STAMS/research](http://CurriculumAssociates.com/STAMS/research).

## COMPONENTS OF MATH INSTRUCTION *(continued)*

Math Strategies	Examples in STAMS® Series	Research Says
<p><b>Meaningful Practice</b></p> <p>Meaningful practice is problem solving that requires students to apply learned concepts and skills.</p>	<p><b>Student Book</b></p> <ul style="list-style-type: none"> <li>• Part One through Part Four: Your Turn</li> <li>• Part Five: Independent practice</li> </ul>	<p>“Meaningful practice: to gain deeper understanding of topic — practice that focuses on building conceptual understanding related to skills and procedures.”</p> <p>— <i>Marzano et al, 2000</i></p>
<p><b>Multiple Representations</b></p> <p>Multiple representations are the ways in which a teacher or student represents a math idea, including spoken, written, symbolic, and concrete formats.</p>	<p><b>Student Book</b></p> <p>Symbolic, pictorial, spoken, and written methods are used throughout each lesson part to instruct students.</p>	<p>“Each of the different types of representation adds a new layer or a new dimension to the understanding of the concept being represented. Some students find some representations easier to understand than others.”</p> <p>— <i>Mendieta, 2006</i></p>
<p><b>Procedural Knowledge</b></p> <p>Procedural knowledge is the understanding of when and how to use mathematical procedures effectively. It aids in automatic recall of facts, allowing for further study of new math concepts and skills.</p>	<p><b>Student Book</b></p> <p>Through scaffolding, students develop procedural knowledge in Part One through Part Four. By Part Five they become independent problem solvers.</p>	<p>“Students need to be efficient and accurate in performing basic computation with whole numbers without having to rely on tables or other aids. They also need to know reasonably efficient and accurate ways to add, subtract, multiply, and divide multi-digit numbers, both mentally and with pencil and paper.”</p> <p>— <i>National Research Council, 2001</i></p>

## GENERAL INSTRUCTIONAL STRATEGIES

Strategies	Examples in STAMS® Series	Research Says
<p><b>Differentiated Instruction</b></p> <p>Differentiated instruction is an instructional approach that supports students of varying abilities to learn the same content. Various techniques or strategies include grouping students by ability level, pairing students for peer learning, or providing off-level lessons that are parallel to students’ abilities.</p>	<p><b>Teacher Guide</b></p> <ul style="list-style-type: none"> <li>• The Differentiating Instruction section in the Overview provides suggestions on ways to meet the needs of all students.</li> <li>• Reteaching Activity for students still struggling to learn the skill</li> <li>• Challenge Activity for students who have mastered the skill</li> <li>• Related STAMS® Lessons that direct teachers to precursor skills</li> </ul>	<p>“Although differentiated instruction is not a new idea, the differentiation movement has recently taken center stage as a means of meeting the needs of all students in the classroom. It is an organized, yet flexible way of proactively adjusting teaching and learning to meet students where they are and help all students achieve maximum growth as learners.”</p> <p>— <i>Tomlinson, 1999</i></p>
<p><b>Explicit Instruction</b></p> <p>Explicit instruction is a method of teaching in which topics are broken down into small parts and taught individually. It involves explanation, demonstration, and practice in a structured environment.</p>	<p><b>Student Book</b></p> <ul style="list-style-type: none"> <li>• Part One and Part Two: Modeled problem solving with scaffolded student participation</li> <li>• Part Three and Part Four: Modeled practice</li> <li>• Part Five: Independent practice</li> </ul> <p><b>Teacher Guide</b></p> <ul style="list-style-type: none"> <li>• Step by Step provides guidance for teachers to most effectively walk students through a concept.</li> </ul>	<p>“Explicit instruction with students who have mathematical difficulties has shown consistently positive effects on performance with word problems and computation. Results are consistent for students with learning disabilities, as well as other students who perform in the lowest third of a typical class.”</p> <p>— <i>NMAP, 2008</i></p>

## GENERAL INSTRUCTIONAL STRATEGIES (continued)

Strategies	Examples in STAMS® Series	Research Says
<p><b>Family Engagement</b></p> <p>Family engagement is a strategy that involves and engages parents, guardians, and other family members in a student’s school life, with the goal of boosting student success.</p>	<p><b>Teacher Guide</b></p> <ul style="list-style-type: none"> <li>• School-Home Connection</li> </ul>	<p>“It is well-documented—and plain common sense—that parental involvement in a child’s education boosts student learning and improves both behavior and attendance.”</p> <p>— <i>A. Duncan, 2010</i></p>
<p><b>Metacognition</b></p> <p>Metacognition is “thinking about thinking” to identify what skills or strategies need to be activated or improved to achieve the next learning goal (see also Think Aloud).</p>	<p><b>Student Book</b></p> <ul style="list-style-type: none"> <li>• Part One and Part Two: Let’s Talk and Think it Through</li> <li>• Part Three: Solve and Check</li> </ul> <p><b>Teacher Guide</b></p> <ul style="list-style-type: none"> <li>• Throughout the lesson, students answer “why questions” posed by the teacher.</li> </ul>	<p>“Individual reflection or interaction with others (both teachers and peers) encourages students to communicate and explain their thinking.”</p> <p>— <i>Reys, Suydam, Lindquist, &amp; Smiths, 1998</i></p> <p>This reflection moves students beyond simple fact recall into deeper thinking of explaining “how” and “why.”</p>
<p><b>Prior Knowledge</b></p> <p>Prior knowledge is the previous experience and knowledge that a student has about a topic that aid learning.</p>	<p><b>Student Book</b></p> <ul style="list-style-type: none"> <li>• Part One and Part Two: Explore</li> </ul> <p><b>Teacher Guide</b></p> <ul style="list-style-type: none"> <li>• Prerequisites</li> <li>• Related STAMS® Lessons</li> </ul>	<p>“Students learn better when new knowledge is connected to things they already know and understand”</p> <p>— <i>Hiebert and Carpenter, 1992; Hiebert et al, 1997</i></p>
<p><b>Real-world Connections</b></p> <p>Real-world connections are links that are made between mathematics concepts and real-life situations.</p>	<p><b>Student Book</b></p> <ul style="list-style-type: none"> <li>• Part One through Part Five: Word problem contexts</li> </ul> <p><b>Teacher Guide</b></p> <ul style="list-style-type: none"> <li>• Real-World Connection</li> <li>• School-Home Connection</li> </ul>	<p>“A synthesis of findings from a small number of high-quality studies indicates that if mathematical ideas are taught using ‘real-world’ contexts, then students’ performance on assessments involving similar “real-world” problems is improved.”</p> <p>— <i>NMAP, 2008</i></p>
<p><b>Scaffolded Instruction</b></p> <p>Scaffolded instruction is the gradual withdrawal of instructional support as a student learns a new concept, skill, or task.</p>	<p><b>Student Book</b></p> <p>The instructional design of Part One through Part Five of every lesson provides a gradual release of responsibility from the teacher to the student.</p>	<p>“There is ample evidence that students are more successful in school and find it more satisfying if they are taught in ways that are responsive to their readiness levels.”</p> <p>— <i>Vygotsky, 1986</i></p>
<p><b>Targeted Instruction</b></p> <p>Targeted instruction is the teaching of focused math concepts and skills that are essential to learning higher-order mathematics.</p>	<p><b>Student Book</b></p> <p>Lessons in the student book are designed to provide deep instruction of key math concepts and skills. Sixteen key topics for each grade level address NCTM Focal Points and Connections.</p>	<p>“When instruction focuses on a small number of key areas of emphasis, students gain extended experience with core concepts and skills. Such experience can facilitate deep understanding, mathematical fluency, and an ability to generalize.”</p> <p>— <i>NCTM, 2006</i></p>

## GENERAL INSTRUCTIONAL STRATEGIES (continued)

Strategies	Examples in STAMS® Series	Research Says
<p><b>Teacher Effectiveness Support</b> Teacher effectiveness support is the inclusion of “best practices” suggestions that allow teachers to maximize their effectiveness and knowledge of mathematics.</p>	<p><b>Teacher Guide</b></p> <ul style="list-style-type: none"> <li>• Math Background</li> <li>• ELL Support</li> <li>• Error Alert</li> <li>• Point-of-use tips</li> <li>• Best Practices</li> </ul>	<p>Recent federal initiatives, such as the ESEA renewal and Race to the Top grant, have centered around the effectiveness of an individual teacher on student achievement. “The mathematics preparation of elementary and middle school teachers must be strengthened as one means for improving teachers’ effectiveness in the classroom.” — <i>NMAP, 2008</i></p>
<p><b>Technology-based Learning</b> Technology-based learning is the use of instructional technology to help improve student achievement.</p>	<p><b>Teacher Guide</b></p> <ul style="list-style-type: none"> <li>• Interactive Whiteboard Lessons, available online</li> </ul>	<p>“Interactive whiteboards in the classroom result in: increased student engagement and motivation; greater opportunities for participation and collaboration; improved personal and social skills and self-confidence; greater progress in mathematics and science for students in years; accommodation for different learning styles; and improved attainment for students with special needs.” — <i>SETDA, 2009</i></p>
<p><b>Think Aloud</b> Think aloud is a strategy in which students talk through the decisions they make and the steps they take to solve a problem.</p>	<p><b>Student Book</b></p> <ul style="list-style-type: none"> <li>• Part One and Part Two: Let’s Talk and Think It Through</li> </ul>	<p>“The process of encouraging students to verbalize their thinking—by talking, writing, or drawing the steps they used in solving a problem—was consistently effective.” — <i>NCTM, 2007</i></p>

## NCTM PROCESS STANDARDS

Process Standards	Examples in STAMS® Series	Research Says
<p><b>Communication</b> Students use the language of math to accurately express their mathematical ideas to others, and analyze and evaluate the mathematical thinking and strategies of others.</p>	<p><b>Student Book</b></p> <ul style="list-style-type: none"> <li>• Part One and Part Two: Let’s Talk</li> <li>• Part Three: Check</li> <li>• Part Four and Part Five: Explanation of solution</li> </ul> <p><b>Teacher Guide</b></p> <ul style="list-style-type: none"> <li>• ELL Support</li> <li>• School-Home Connection</li> <li>• Vocabulary Activity</li> </ul>	<p>“Encouraging math talk so that students can clarify their strategies to themselves and others, and compare the benefits and limitations of alternate approaches to problem solving.” — <i>National Research Council, 2001</i></p>
<p><b>Connections</b> Students recognize and use connections among mathematical ideas, such as linking knowledge of the subtraction of whole numbers to the subtraction of decimals or fractions. Students also connect math concepts to their daily lives, and to other subjects, such as science.</p>	<p><b>Student Book</b></p> <ul style="list-style-type: none"> <li>• Part One and Part Two: Explore, Think, and Connect</li> </ul> <p><b>Teacher Guide</b></p> <ul style="list-style-type: none"> <li>• Math Background</li> <li>• Real-World Connection</li> </ul>	<p>“Connections are most useful when they link related concepts and methods in appropriate ways. Appropriate ways include methods of extending the understanding of one math concept to another (using multiple representations). Rote memorization does not lead to understanding and building connections.” — <i>National Research Council, 2001</i></p>

## NCTM PROCESS STANDARDS (continued)

Process Standards	Examples in STAMS® Series	Research Says
<p><b>Problem Solving</b></p> <p>Students build new math knowledge through problem solving and use various strategies to solve problems in math and in other contexts.</p>	<p><b>Student Book</b></p> <ul style="list-style-type: none"> <li>• Part One, Part Two, Part Three, Part Four: Your Turn</li> <li>• Part Five: Independent practice</li> </ul>	<p>“Problem solving is an integral part of all mathematics learning. In everyday life and in the workplace, being able to solve problems can lead to great advantages.”</p> <p>— <i>NCTM, 2000</i></p>
<p><b>Reasoning and Proof</b></p> <p>Students recognize, use, and evaluate various types of reasoning and methods of proof. Reasoning enables students to make sense of new mathematical ideas. Proofs build a logical argument based on known facts.</p>	<p><b>Student Book</b></p> <ul style="list-style-type: none"> <li>• Part One and Part Two: Let’s Talk and Think It Through</li> <li>• Part Three: Solve and Check</li> <li>• Part Four and Part Five: Explanation of solution</li> </ul> <p><b>Teacher Guide</b></p> <p>Many teacher tips show how to help students reason through a problem.</p>	<p>“Knowing particular mathematical ideas and procedures as mere fact or routine is insufficient for using those ideas flexibly in diverse cases. Making mathematics reasonable means making it reasoned and, therefore, known in useful and usable ways.”</p> <p>— <i>NCTM, 2003</i></p>
<p><b>Representations</b></p> <p>Students communicate, clarify, or extend mathematical ideas through concrete or visual models.</p> <p>A representation may be a number sentence, manipulatives, diagrams or graphs and/or symbols.</p>	<p><b>Student Book</b></p> <ul style="list-style-type: none"> <li>• Part One and Part Two: Use of visual models</li> <li>• Part Four and Part Five: Show</li> </ul>	<p>“Intervention materials should include opportunities for students to work with visual representations of mathematical ideas and interventionists should be proficient in the use of visual representations of mathematical ideas.”</p> <p>— <i>Gersten et al, 2009</i></p>

## ASSESSMENT AND INTERVENTION

Strategies and Features	Examples in CAMS® and STAMS® Series	Research Says
<p><b>Data-driven Instruction</b></p> <p>Data-driven instruction is the use of instructional decisions based on the systematic collection of data that reflects students’ understanding.</p>	<p><b>CAMS® and CAMS® Online</b></p> <ul style="list-style-type: none"> <li>• 1 Pretest</li> <li>• 4 Benchmarks</li> <li>• 1 Post Test</li> </ul>	<p>“Districts and schools that are improving generally show a commitment to the use of student assessment data to diagnose weaknesses and guide improvement efforts.”</p> <p>— <i>U.S. Department of Education, 2010</i></p>
<p><b>Progress Monitoring</b></p> <p>Progress monitoring is a strategy that involves frequent, in-classroom progress checks of students’ understanding and mastery of math concepts and skills.</p>	<p><b>Student Book</b></p> <ul style="list-style-type: none"> <li>• Part One through Part Four: Your Turn</li> <li>• Part Five: Independent practice</li> </ul> <p><b>CAMS® and CAMS® Online</b></p> <ul style="list-style-type: none"> <li>• 1 Pretest</li> <li>• 4 Benchmarks</li> <li>• 1 Post Test</li> </ul>	<p>“Teachers’ regular use of formative assessments improves their students’ learning, especially if teachers have additional guidance on using the assessment results to design and individualize instruction.”</p> <p>— <i>NMAP, 2008</i></p>

## Correlations Charts

**NCTM Focal Points and Connections** The chart below indicates the lessons in *STAMS® Book D* that provide instruction for the NCTM Focal Points and related Connections for grade 4. (For correlations between the NCTM Process Standards and the *STAMS® Series*, see pages 29 and 30 of the teacher guide.)

NCTM Focal Points and Connections for Grade 4	<i>STAMS® Book D</i>
<b>FOCAL POINTS</b>	
<b>Number and Operations and Algebra:</b> Students develop quick recall of basic multiplication facts and related division facts, and apply appropriate methods to multiply multidigit whole numbers.	Lessons 1, 2, 3, 4, 17
<b>Number and Operations:</b> Students develop an understanding of decimals, including the relationship between fractions and decimals.	Lessons 10, 11, 12
<b>Measurement:</b> Students develop an understanding of area and then determine the areas of two-dimensional shapes.	Lessons 14, 15
<b>CONNECTIONS</b>	
<b>Measurement:</b> Students classify and measure angles.	Lesson 13
<b>Data Analysis:</b> Students analyze line plots and use them to solve problems.	Lesson 16
<b>Number and Operations:</b> Students develop understandings of strategies for multidigit division.	Lessons 5, 6, 7, 18
<b>Number and Operations:</b> Students develop their ability to recognize equivalent fractions and their understanding of techniques for generating and simplifying equivalent fractions.	Lessons 8, 9

**Common Core State Standards** The chart below correlates the lessons in *STAMS® Book D* with Common Core State Standards for grade 4 mathematics.

Common Core State Standards for Grade 4 Mathematics	<i>STAMS® Book D</i>	Common Core State Standards for Grade 4 Mathematics	<i>STAMS® Book D</i>
<b>Operations and Algebraic Thinking</b>		4.NF.3	Lesson 19
4.OA.1	Lesson 1	4.NF.6	Lessons 10, 12
4.OA.4	Lessons 2, 9	4.NF.7	Lesson 11
<b>Number and Operations in Base Ten</b>		<b>Measurement and Data</b>	
4.NBT.1	Lessons 2, 3, 4, 6, 7, 17, 18	4.MD.3	Lessons 14, 15
4.NBT.4	Lessons 4, 6, 7	4.MD.4	Lesson 16
4.NBT.5	Lessons 2, 3, 4, 17	4.MD.5	Lesson 13
4.NBT.6	Lessons 5, 6, 7, 18	<b>Geometry</b>	
<b>Number and Operations—Fractions</b>		4.G.2	Lesson 13
4.NF.1	Lessons 8, 9		
4.NF.2	Lessons 8, 9		

# Lesson 4 MULTIPLY BY 2-DIGIT NUMBERS

## LESSON OBJECTIVES

Students will:

- Use place value and partial products to multiply two 2-digit numbers.
- Learn a quicker algorithm for recording the partial products when multiplying two 2-digit numbers.

## PREREQUISITES

Students should be able to:

- Multiply a 1-digit number by a 2-digit number.
- Regroup ones as tens and tens as hundreds.
- Multiply by multiples of 10.

## RELATED STAMS® LESSONS

- **Book D – Lesson 2**

*Multiply Mentally* teaches how to multiply by multiples of 10.

- **Book D – Lesson 3**

*Multiply by 1-Digit Numbers* teaches how to multiply a 2-digit number by a 1-digit number.

## VOCABULARY

### PAGE 34

- **place value:** the value of a digit depending on its place in a number
- **partial product:** the result of multiplying a digit of one factor by one or more digits of another factor
- **product:** the result of multiplying numbers together

### PAGE 36

- **regroup:** to use place value to trade amounts of equal value, such as ones for tens or tens for ones

## MATH BACKGROUND

Lesson 3 and this lesson both show how to multiply numbers, first showing partial products explicitly, and then showing the standard algorithm, in which partial products are not explicitly shown.

The conceptual basis for both lessons is the distributive property, which states that for any numbers  $a$ ,  $b$ , and  $c$ ,  $a(b + c) = ab + ac$  and  $(a + b)c = ac + bc$ .

Multiplying a 2-digit number by a 1-digit number:

$$8 \times 56 = 8 \times (50 + 6) = 8 \times 50 + 8 \times 6$$

$$a(b + c) = ab + ac$$

For multiplying two 2-digit numbers, the distributive property is used three times.

$$\begin{aligned} 24 \times 31 &= (20 + 4) \times (30 + 1) \\ &= \boxed{20 \times (30 + 1) + 4 \times (30 + 1)}^1 \\ &= \boxed{20 \times 30 + 20 \times 1} + \boxed{4 \times 30 + 4 \times 1} \\ &\qquad\qquad\qquad 2 \qquad\qquad\qquad 3 \end{aligned}$$



### Interactive Whiteboard

#### Visualize Multiplying by 2-Digit Numbers

Go to the *Interactive Whiteboard Lessons* to bring Parts One and Two to life. Use features such as drag and drop to deepen students' understanding of multiplying by a 2-digit number.

## Modeled Instruction

**Lesson 4** MULTIPLY BY 2-DIGIT NUMBERS  
PART ONE: Learn About Multiplying Two 2-Digit Numbers

**Explore** How can you use place value to multiply two 2-digit numbers?

You can use **place value** to multiply a 1-digit number by a 2-digit number.

$$\begin{array}{r} 56 \\ \times 8 \\ \hline 48 \leftarrow \text{Multiply the ones. } 8 \times 6 \\ + 400 \leftarrow \text{Multiply the tens. } 8 \times 50 \\ \hline 448 \leftarrow \text{Add partial products.} \end{array}$$

How can you use place value to multiply two 2-digit numbers?

**Think** Find  $31 \times 24$ .

$31 = \underline{3}$  tens and  $\underline{1}$  one, or  $\underline{30} + \underline{1}$   
 $24 = \underline{2}$  tens and  $\underline{4}$  ones, or  $\underline{20} + \underline{4}$

**Connect** To find  $31 \times 24$ , you can use these steps:

1. Multiply the ones and tens in 31 by the ones in 24.	2. Multiply the ones and tens in 31 by the tens in 24.	3. Add the partial products.
$\begin{array}{r} 31 \\ \times 24 \\ \hline 120 \leftarrow 4 \times 30 \\ 120 \leftarrow 4 \times 30 \\ \hline 744 \end{array}$	$\begin{array}{r} 31 \\ \times 24 \\ \hline 120 \leftarrow 4 \times 30 \\ 600 \leftarrow 20 \times 30 \\ \hline 744 \end{array}$	$\begin{array}{r} 31 \\ \times 24 \\ \hline 120 \\ 20 \\ + 600 \\ \hline 744 \end{array}$

The **product** of  $31 \times 24$  is 744.

**Let's Talk** When you multiply a 2-digit number by a 2-digit number, there are 4 partial products. Why do you think this is so?

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## Guided Instruction

**Think It Through**

**Fill in the blanks. Solve the problem.**

In Jack's class, there are 23 boxes of crayons. There are 36 crayons in each box. How many crayons are there in all?

$23 \times 36 = \square$

■ Multiply the ones and tens in 36 by the ones in 23.

$$\begin{array}{r} 36 \\ \times 23 \\ \hline 108 \leftarrow 3 \times 6 \\ 720 \leftarrow 3 \times 30 \end{array}$$

■ Multiply the ones and tens in 36 by the tens in 23.

$$\begin{array}{r} 36 \\ \times 23 \\ \hline 18 \\ 720 \\ \hline 828 \end{array}$$

■ Add the partial products.

$$\begin{array}{r} 36 \\ \times 23 \\ \hline 18 \\ 720 \\ + 600 \\ \hline 828 \end{array}$$

**Solution:** There are 828 crayons in all.

**Your Turn** Now, use what you know to solve this problem.

1. There are 13 bagels in a baker's dozen. How many bagels are there in 48 baker's dozens?

Ⓐ 264      Ⓒ 552  
Ⓑ 524      Ⓓ 624

Number and Operations Multiply by 2-Digit Numbers 35

### AT A GLANCE

Students activate their background knowledge of using place value to multiply a 1-digit number by a 2-digit number. Then they apply these principles to multiply two 2-digit numbers.

### STEP BY STEP

#### PAGE 34

- Introduce the **Question** at the top of the page.
- Read aloud the steps shown in **Explore**.
- Read **Think** with students. Point out that 31 and 24 can be regrouped so they are easier to multiply.
- Discuss **Connect** with students. Make sure students can identify what was multiplied to get each partial product.

**ELL Support:** Remind students that *ones* refers to the digit in the ones place and *tens* refers to the digit in the tens place. Emphasize, for example, that *3 tens* is the same as *30*.

- Organize students in pairs or groups for **Let's Talk** and monitor their discussions. Be sure students grasp that each place in one number has to be multiplied by each place in the other number. When multiplying a 2-digit number by a 2-digit number, you multiply ones by ones, ones by tens, tens by ones, and tens by tens.

#### PAGE 35

- Read the **Think It Through** problem with students.

**Tip:** Before solving the problem, have students write the 4 multiplication expressions they will use to find the total product.

- Guide students as they solve the problem. Pause as they fill in missing information. Then discuss each response.
- Monitor students as they complete **Your Turn**. Suggest using grid paper to align digits by place value. Then discuss the correct answer.

**Error Alert:** Students who chose A may have found  $10 \times 4$ , not  $10 \times 40$ .



### ADDITIONAL ACTIVITY

See **Hands-on Activity** (page 65).