Practice

STAMS® series D
Teacher Guide

Solve STAMS®™

Data Analysis

Geometry and Measurement

Number and Operations

Curriculum Associates

Table of Contents

CONTENTS IN BRIEF

PROGRAM OVERVIEW

Full practices on foundational concepts and skills

PART 1 LESSON PLANS

Number and Operations

Multiplication

Division

Fractions

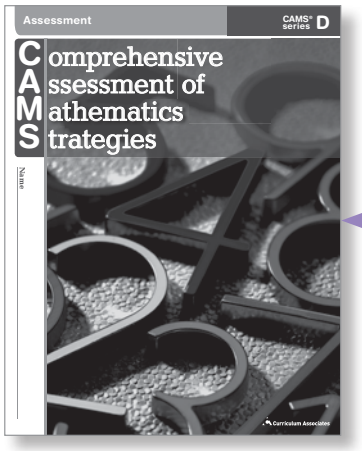
Short practices on additional CCSS grade-level standards

PART 3 REPRODUCIBLE MINI-PRACTICES

Classroom Math Intervention Program

The classroom math intervention program integrates assessment, data-driven instruction, and meaningful practice. The program focuses on the critical math concepts and skills that students need to advance to the next grade level. The *CAMS®*, *STAMS®*, and *STAMS® Solve™* Series work together effectively to ensure that your students gain a solid understanding of key math concepts and skills, helping them become independent problem solvers and succeed on high-stakes state tests.

CAMS®



Books C–H (Grades 3–8)

Assessment

Use the *CAMS® Assessment Series* for data-driven instruction.

- Pretest
- Benchmarks
- Post Test

STAMS®

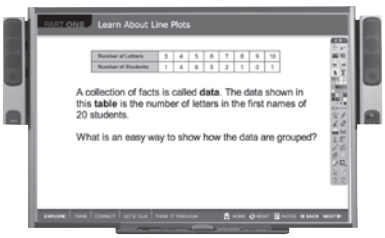
Books C–H (Grades 3–8)

Instruction

Use the *STAMS® Instruction Series* for in-depth teaching of 16 foundational concepts and skills.

- Highly scaffolded lessons with gradual release of responsibility
- Emphasis on errors as opportunities for learning

STAMS® IWB



Levels C–H (Grades 3–8)

Interactive Whiteboard Lessons

Use the *STAMS® Interactive Whiteboard Lessons* to enhance *STAMS®* instruction or for reteaching prior to *Solve* practice.

Solve

Books C–H (Grades 3–8)

Practice

Use the *STAMS® Solve™ Practice Series* for meaningful practice and reinforcement of 16 foundational concepts and skills, plus deeper practice with the Common Core State Standards.

- Two-part practices for each concept or skill offer a variety of engaging problems in different formats.
- Problems encourage students to reason—not rely on rote or repetition—to solve them.
- In each part, problems require increasing levels of higher-order thinking and become progressively more difficult.
- Supportive teacher guides make it easy to assign, correct, and review each practice.

Addresses Transition to Common Core State Standards

- *Solve* addresses all grade-level Common Core State Standards (CCSS)
- Builds conceptual understanding and procedural fluency, as emphasized by CCSS
- Helps students make connections between related concepts and skills

Solve Overview

Each level of the *Solve* Practice Series provides students with meaningful practice of 16 foundational math concepts and skills to reinforce conceptual understanding and procedural fluency and help students achieve mathematical proficiency. Following classroom instruction on each concept or skill, assign the corresponding *Solve* practice for reinforcement.

Student Book

Designed to motivate struggling students, each *Solve* practice clearly presents 20 engaging problems in a variety of formats. These carefully crafted problems develop students' reasoning and problem solving skills.

Practices

Each two-part *Solve* practice focuses on one concept or skill. Part One provides practice with the simpler aspect of the concept or skill, while Part Two provides practice with another more complex aspect of the same concept or skill to increase students' depth of knowledge. Each part begins with an example, typical for the concept or skill, which provides a model for students as they solve the problems independently. As each part progresses, the problems become less scaffolded, more challenging, and require higher levels of reasoning.

Reviews

Following each group of four practices are two *Solve* reviews. Each 10-problem review provides mixed practice of the preceding four concepts or skills, including problems that require students to make connections between topics and apply multiple concepts and skills.

Level D, Student Book

Additional Practices and Reviews for the Common Core State Standards

The Common Core State Standards (CCSS) present 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 differences in timelines for implementing the CCSS, *Solve* offers Additional Practices and Reviews at the back of each student book, C–G, plus Reproducible Mini-Practices at the back of each teacher guide, C–H.

- *Solve* Additional Practices and Mini-Practices for CCSS are organized in the same topic groupings as the 16 foundational grade-level practices.
- Refer to the Suggested Pacing Chart on page 13 for when to use each Additional Practice, Review, or Mini-Practice.

Teacher Guide

Comprehensive support for each *Solve* practice or review helps teachers check student progress, anticipate difficulties, and provide effective remediation.

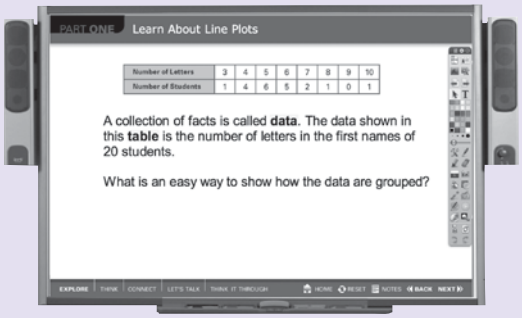
- An overview of each practice or review quickly prepares teachers by identifying objectives, vocabulary, correlations to the Common Core State Standards, and optional *STAMS*® instruction.
- Facsimiles of the student pages with correct answers noted are a visual answer key for each practice or review.
- For each part of the practice or review, common pitfalls help teachers pinpoint student difficulties and instructional tips guide teachers to redirect students.
- Reproducible Mini-Practices ensure coverage of all grade-level Common Core State Standards.
- Reproducible Individual Tracking Chart helps teachers monitor student performance and make remediation decisions.

Level D, Teacher Guide

Interactive Whiteboard (IWB) Lessons

Interactive Whiteboard Lessons are available for each *Solve* practice in the student books. The IWB lessons offer students opportunities to question and explore mathematical concepts in greater depth.

- IWB lessons can be used to review the concept or skill prior to assignment of each *Solve* practice.
- Features, such as cloning and dragging objects, and whiteboard tools, such as highlighters, keep students actively engaged in learning.
- Teacher notes help maximize the instructional impact, more fully preparing students to complete the related *Solve* practice independently.



Level D, IWB Lesson

To download your
Interactive Whiteboard Lessons
and a User Guide, go to
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.*

Implementing *Solve* with the Classroom Math Intervention Program

Option 1: Data-Driven Instruction

1 Diagnose with *CAMS*® Pretest

- Use the *CAMS*® Pretest to place students in the *STAMS*® Series. Results identify which *STAMS*® lessons and corresponding *Solve* practices students need.

2 Instruct with *STAMS*® Lessons

- Pinpoint a specific lesson in the *STAMS*® student book to remediate an area that needs improvement.

3 Reinforce with *Solve* Practices

- Assign the corresponding practice in the *Solve* student book to provide reinforcement for the *STAMS*® lesson you just taught.

4 Monitor Progress with *CAMS*® Benchmarks

- Assess progress in all 16 foundational topics with the four 16-item *CAMS*® Benchmarks at four points during the year.

5 Assess Mastery with *CAMS*® Post Test

- Use the *CAMS*® Post Test to assess students' mastery of the 16 math concepts and skills following instruction with *STAMS*® and practice with *Solve*.

Option 2: Comprehensive Instruction

For implementation of *CAMS*® and all 16 *STAMS*® lessons and the corresponding *Solve* practices, follow this suggested pacing chart. Allocate 21 weeks, with each *STAMS*® lesson spanning 5 days and the related *Solve* practice being completed simultaneously. (See the Week at a Glance on page 11 for more details.)

Suggested Pacing Chart

Day(s)	Lesson and Practice	*STAMS*® *Instruction and Solve Practice*	*CAMS*® *Assessment*	Time (Minutes)
1–5		*CAMS*® 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
26–27		*Solve* Reviews 1–2		15/day
28		*CAMS*® Benchmark 1		30–45/day
29–33	5	Relate Division to Multiplication		30–45/day
34–38	6	Divide Without Regrouping		30–45/day
39–43	7	Divide with Regrouping		30–45/day
44–48	8	Equivalent Fractions		30–45/day
49–50		*Solve* Reviews 3–4		15/day
51		*CAMS*® Benchmark 2		30–45/day
52–56	9	Simplify Fractions		30–45/day
57–61	10	Decimal Place Value		30–45/day
62–66	11	Compare and Order Decimals		30–45/day
67–71	12	Relate Decimals to Fractions		30–45/day
72–73		*Solve* Reviews 5–6		15/day
74		*CAMS*® Benchmark 3		30–45/day
75–79	13	Angles		30–45/day
80–84	14	Understand Area		30–45/day
85–89	15	Area of Rectangles		30–45/day
90–94	16	Line Plots		30–45/day
95–96		*Solve* Reviews 7–8		15/day
97		*CAMS*® Benchmark 4		30–45/day
98–102		*CAMS*® Post Test		30–45/day

Note: Allocate 15 minutes more per day if *STAMS*® additional activities are used in conjunction with each lesson and practice.

Using *STAMS*® and *Solve* Together

Week at a Glance

The *STAMS*® *Instruction Series* and the *Solve Practice Series* are companion programs—instruct with the *STAMS*® lessons and reinforce with the *Solve* practices.

Suggested *STAMS*® and *Solve* Pacing Chart

		Monday	Tuesday	Wednesday	Thursday	Friday
STAMS® Instruction Series		modeled and guided instruction		modeled and guided practice		independent practice
	Direct Instruction with *STAMS*® Lesson	**Part One** Teach new skill. Students solve Your Turn problem. **30 minutes**	**Part Two** Teach new skill. Students solve Your Turn problem. **30 minutes**	**Part Three** Model multiple-choice problem. Students solve multiple-choice problems. **30 minutes**	**Part Four** Model extended-response problem. Students solve extended-response problem. **30 minutes**	**Part Five** Students solve problems in test-prep format. Correct and review answers. **30 minutes**
	(Optional Additional Activity)	**(15 minutes)**	**(15 minutes)**	**(15 minutes)**	**(15 minutes)**	**(15 minutes)**
Solve Practice Series		independent practice				
	Reinforcement with *Solve* Practice	**Part One** Students practice the skill by solving a variety of problems. Correct and review answers. **15 minutes**	**Part Two** Students practice the skill by solving a variety of problems. Correct and review answers. **15 minutes**			
	Additional Reinforcement with *Solve* Reviews			After every 4 weeks, assign first review for cumulative practice of 4 lessons. **15 minutes**	Assign second review for cumulative practice of 4 lessons. **15 minutes**	

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Implementing *Solve* Independently

1 Reinforce Foundational Concepts and Skills with *Solve* Practices

- Have students complete the 16 practices in the *Solve* student book as independent work to reinforce conceptual understanding of all grade-level foundational math concepts and skills. See the Suggested Pacing Chart to the right.

2 Build Connections Among Topics with *Solve* Reviews

- Solidify students' understanding of the 16 foundational topics with the eight cumulative reviews—two reviews for each group of four topics.

Optional

Introduce Additional CCSS Concepts and Skills with *Solve* Additional Practices and Reviews (see page 13)

- To ensure coverage of all grade-level Common Core State Standards (CCSS), have students complete the additional practices, reviews, and mini-practices.

Suggested Pacing Chart for Solve *Book D*

For implementation of all 16 *Solve* practices, follow this suggested pacing guide. Allocate 16 weeks, with one practice being completed per week and one pair of reviews at the end of every fourth week.

Week	Practice	*Solve* Practice	*Solve* Review	Time (Minutes)
1	1	Multiplication Properties		30/week
2	2	Multiply Mentally		30/week
3	3	Multiply by 1-Digit Numbers		30/week
4	4	Multiply by 2-Digit Numbers		30/week
		Reviews 1–2		30/week
5	5	Relate Division to Multiplication		30/week
6	6	Divide Without Regrouping		30/week
7	7	Divide with Regrouping		30/week
8	8	Equivalent Fractions		30/week
		Reviews 3–4		30/week
9	9	Simplify Fractions		30/week
10	10	Decimal Place Value		30/week
11	11	Compare and Order Decimals		30/week
12	12	Relate Decimals to Fractions		30/week
		Reviews 5–6		30/week
13	13	Angles		30/week
14	14	Understand Area		30/week
15	15	Area of Rectangles		30/week
16	16	Line Plots		30/week
		Reviews 7–8		30/week

. . . With All CCSS Standards

Using *Solve* to Support Your Transition to the Common Core State Standards

- The Common Core State Standards (CCSS) present some math concepts and skills at different grade levels than the NCTM Focal Points and state standards have recommended. To address this discrepancy in grade-level content and differences in timelines for implementing the CCSS, *Solve* offers Additional Practices and Reviews at the back of each student book, C–G, plus Reproducible Mini-Practices at the back of each teacher guide, C–H.
- Each additional practice or review has the same length and depth as each of the 16 foundational practices or reviews.
- Each mini-practice provides a short practice, designed to familiarize students with a new grade-level CCSS concept or skill.
- If you are transitioning to the CCSS, use all the extra resources provided with *Solve*. This Suggested Pacing Chart highlights when to use these resources in conjunction with the 16 foundational practices and cumulative reviews.

Suggested Pacing Chart for Solve *Book D*—All CCSS Standards

Allocate 25 weeks for full implementation of *Solve*.

Week	Practice	*Solve* Practice	*Solve* Review	Extra Practice or Review	Time (Minutes)
1	1	Multiplication Properties			30/week
2	2	Multiply Mentally			30/week
3	3	Multiply by 1-Digit Numbers			30/week
4	4	Multiply by 2-Digit Numbers			30/week
		Reviews 1–2 (Practices 1–4)			30/week
5	17	Multiply 3-Digit Numbers			30/week
6	5	Relate Division to Multiplication			30/week
7	20*	Multiplicative Comparisons			15/week
8	6	Divide Without Regrouping			30/week
9	7	Divide with Regrouping			30/week
10	18	1-Digit Divisors			30/week
11	8	Equivalent Fractions			30/week
		Reviews 3–4 (Practices 5–8)			30/week
12	9	Simplify Fractions			30/week
13	19	Add and Subtract Like Fractions			30/week
		Reviews 9–10 (Practices 17–19)			30/week
14	10	Decimal Place Value			30/week
15	11	Compare and Order Decimals			30/week
16	12	Relate Decimals to Fractions			30/week
		Reviews 5–6 (Practices 9–12)			30/week
17	13	Angles			30/week
18	21*	Measure Angles			15/week
19	22*	Angle Measures			15/week
20	23*	Symmetry of Plane Figures			15/week
21	14	Understand Area			30/week
22	24*	Changing Units of Length			15/week
23	25*	Measurement Word Problems			15/week
24	15	Area of Rectangles			30/week
25	16	Line Plots			30/week
		Reviews 7–8 (Practices 13–16)			30/week

*Reproducible Mini-Practices

Features of a *Solve* Practice

This 4-page section guides teachers through a sample lesson plan from the *Solve* teacher guide, which shows facsimiles of the student book practice. Numbered boxes call out and describe the key features in both the teacher guide and the student book.

OVERVIEW

PRACTICE 12
Parts One and Two

RELATE DECIMALS TO FRACTIONS

1

OBJECTIVES

In Part One, students will:

- Write in simplest form fractions that are equivalent to decimals.
- Use reasoning to analyze and correct errors in writing decimals and fractions shown by models.

In Part Two, students will:

- Write in simplest form fractions that are equivalent to decimals.
- Write decimals that are equivalent to fractions.
- Use reasoning to solve problems involving equivalent fractions and decimals.

2

VOCABULARY

Part One

- **decimal:** a number that has a whole-number part and a part less than 1
- **tenths:** in a decimal number, the place immediately to the right of the decimal point
- **fraction:** a number that names part of a whole
- **simplest form:** a fraction in which the numerator and denominator can both be divided evenly only by the number 1

Part Two

- **hundredths:** in a decimal number, two places to the right of the decimal point

3

CORRELATION TO COMMON CORE STATE STANDARDS

Number and Operations—Fractions

- Extend understanding of fraction equivalence and ordering—4.NF.1
- Understand decimal notation for fractions, and compare decimal fractions—4.NF.6

Mathematical Practices

3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
6. Attend to precision.

4

RELATED *STAMS*® INSTRUCTION

For instruction that supports this practice, go to:

***STAMS*®, Book D, Lesson 12, Relate Decimals to Fractions, pp. 114–123**

***STAMS*® Interactive Whiteboard Lessons, Level D, Visualize Relating Decimals to Fractions**
http://www.curriculumassociates.com/STAMS/IWB/

Use features such as interactive fraction models to deepen students' understanding of relating decimals to fractions.

Level D, Teacher Guide

1 **Objectives:** Identifies skill- and process-related goals for students.

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

3 **Correlation to Common Core State Standards:** Correlates the CCSS content standards and mathematical practices to the practice.

4 **Related *STAMS*© Instruction:** Identifies optional instruction that supports the practice, including corresponding lessons from the *STAMS*® *Instruction Series* and the *STAMS*® Interactive Whiteboard Lessons.

Some lesson plans also include a **Related Additional Practice and Review** or **Related Mini-Practice** feature, which identifies optional practice on a new grade-level CCSS concept or skill.

Tips for using the Interactive Whiteboard Lessons:

- Review the skill practiced in Part One and Part Two of *Solve* with the Interactive Whiteboard Lessons before students begin solving the practice problems.
- Alternatively, reteach the skill using the Interactive Whiteboard Lessons if students are struggling to complete the problems.
- You may also wish to access Interactive Whiteboard Lessons from previous levels to quickly address gaps in students' background knowledge.
- Click on and preview the teacher notes before teaching the lesson. Print out these notes for easy reference.
- Encourage student participation. Allow plenty of time for students to use the interactive whiteboard features to work out problems and present solutions.
- 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.* Use the password STAMSIWB.

Best Practices

Math Vocabulary

Knowledge of math terminology is critical to students' understanding of concepts and skills and their ability to apply them to problem solving. To master math vocabulary and effectively communicate mathematical ideas, students must see and use the words in context frequently.

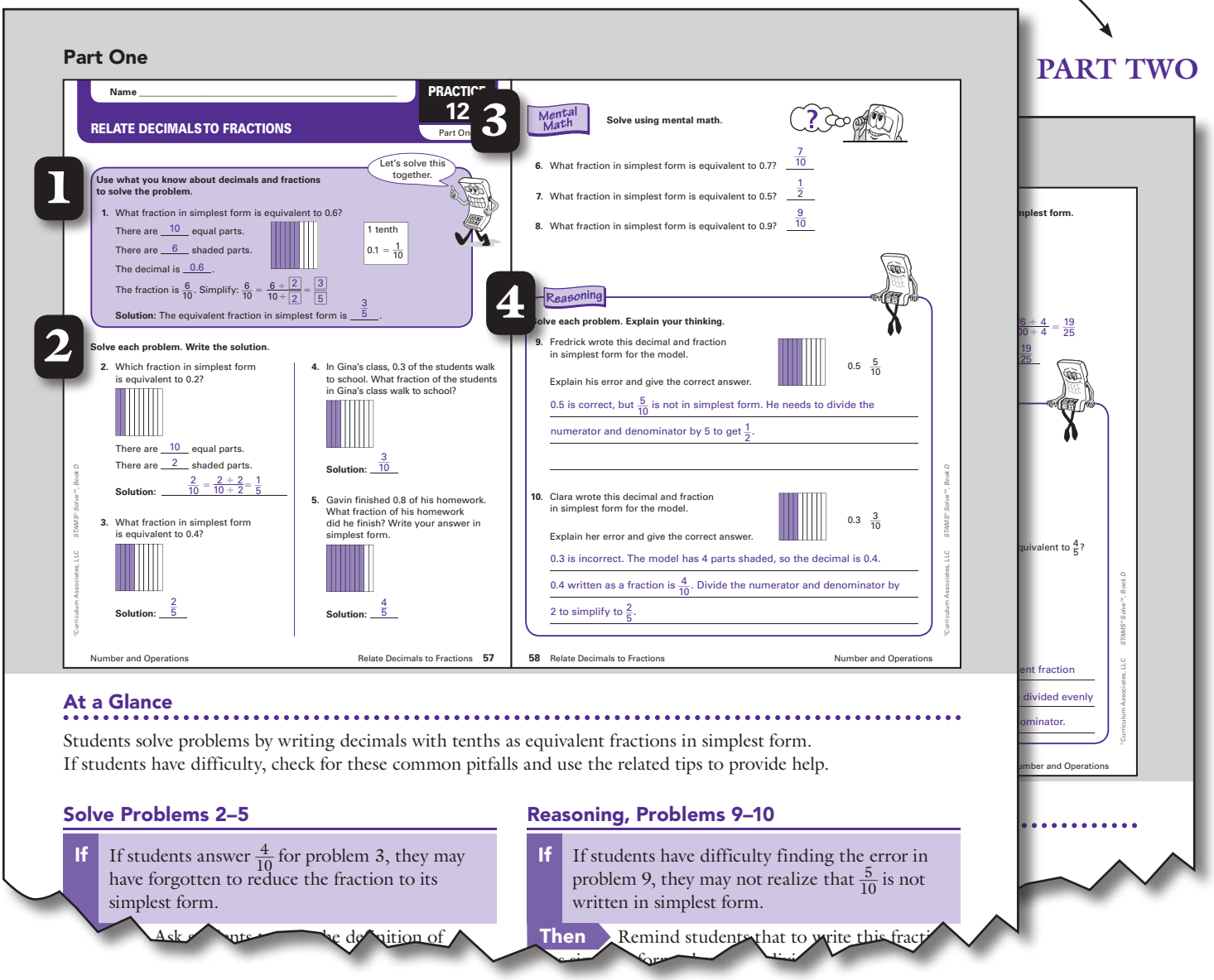
- Review vocabulary used in a practice before students begin solving the problems.
- Have students underline or highlight vocabulary as they encounter it in the practice.
- Encourage students to reference the Glossary at the back of their books when they do not understand a term.
- Suggest that students add their own terms and definitions to the Glossary, along with examples and illustrations.
- Remind students to use math terms whenever a practice problem asks for an explanation.

Student Book Features

Part One and Part Two have identical formats and features.

PART ONE

PART TWO



At a Glance

Students solve problems by writing decimals with tenths as equivalent fractions in simplest form.
If students have difficulty, check for these common pitfalls and use the related tips to provide help.

Solve Problems 2–5

If If students answer $\frac{4}{10}$ for problem 3, they may have forgotten to reduce the fraction to its simplest form.

Reasoning, Problems 9–10

If If students have difficulty finding the error in problem 9, they may not realize that $\frac{5}{10}$ is not written in simplest form.

Then Remind students that to write this fracti

1. **Example problem 1:** Provides students with a model for solving practice problems 2–10.
2. **Solve problems:** Build flexibility, asking students to solve problems in different formats.
3. **Mental Math:** Builds fluency, challenging students to solve problems in their heads, without pencil and paper or calculator.
4. **Reasoning:** Develops high-order thinking, requiring students to analyze, evaluate, justify, or explain.

Some practices also include **Connections** activities where students apply or extend their learning or make connections between concepts and skills.

Using *Solve* Practice Features for Differentiation

Solve practices include several features that support differentiating practice to meet the needs of students with varying levels of proficiency.

1

Highly scaffolded example

In the example, most problem-solving steps are provided to the student. With support from the text, the student completes the remaining steps and writes the solution. This example serves as a model for the remaining 9 problems.

Tips for struggling students and ELL students

- Preview math vocabulary (see page 15) used in the example.
- Read aloud the example to ensure students understand the problem.
- Demonstrate how to complete the example by guiding students through each step.
- Review the concept or skill visually with the *STAMS*® Interactive Whiteboard Lesson.

2–4

Progressively more difficult problems

Problems 2 through 10 become gradually less scaffolded, progressively more difficult, and require increasing levels of higher-order thinking.

Tips for struggling students and ELL students

- Provide manipulatives and other tools, when appropriate, to give students another more concrete approach to problem solving.
- Model how to solve the Mental Math and Reasoning problems by thinking aloud step by step through a few examples.

1–4

Multiple problem types

Practice problems include fill-in-the-blank, matching, multiple-choice, short-response, and extended-response formats.

Tips for struggling students and ELL Students

Use the following tips to support students when they write answers to short-response and extended-response problems:

- Pair students to share their thinking before they write to help them reason and communicate mathematically.
- Encourage students to think aloud quietly as they write their explanations.

Best Practices

Reasoning and Communicating About Math

The Mental Math and Reasoning problems are ideal opportunities for students to develop problem-solving skills.

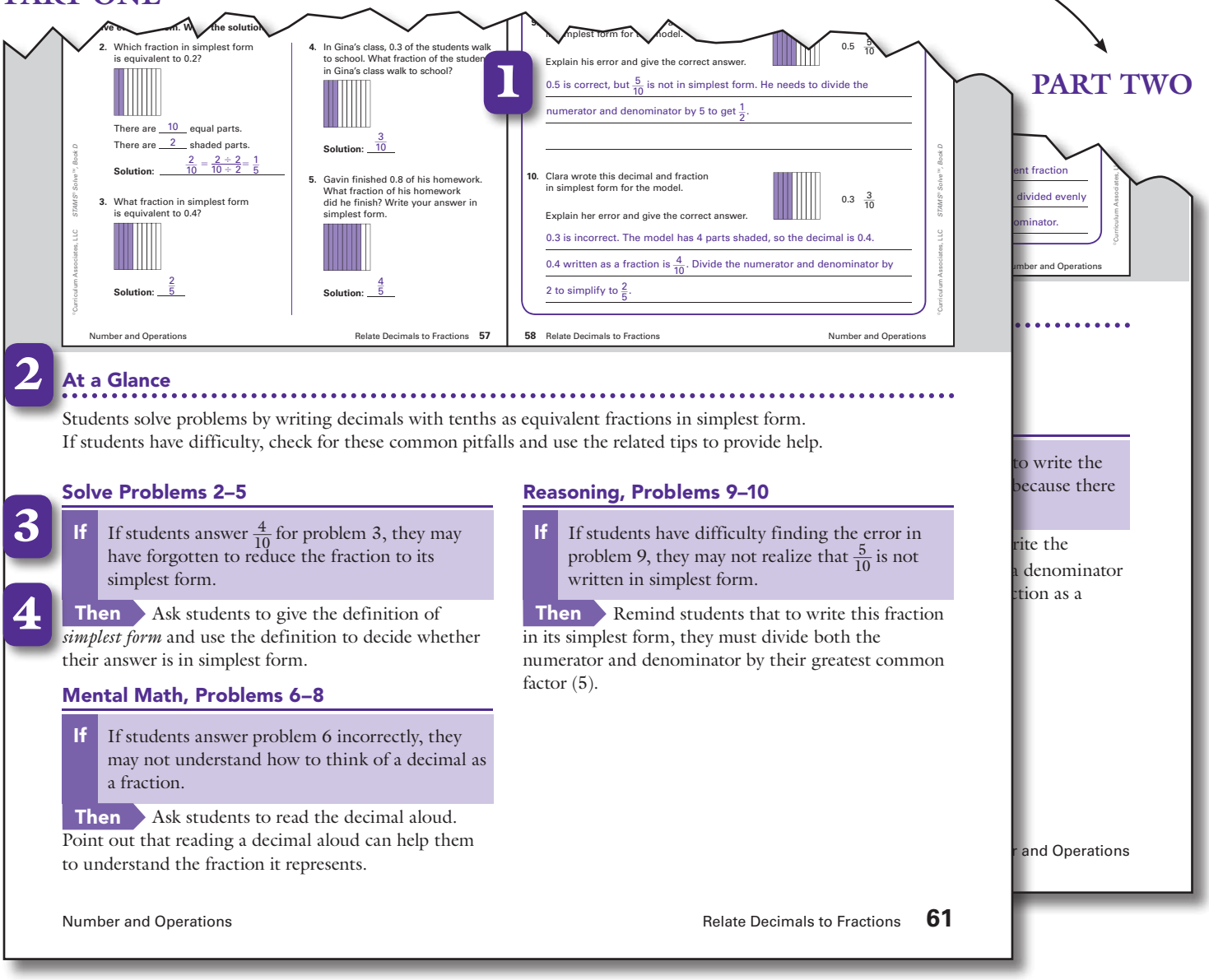
- Pair or group students with varying levels of proficiency to read a problem, identify what the problem is asking, and brainstorm strategies for solving it.
- Have students choose a few strategies and use them to solve the problem collaboratively. Encourage students to record and discuss their work.
- After students have solved the problem, have a representative from each pair or group share their strategies and solutions with the class.
- Discuss the various strategies. Ask students to consider which strategies worked best and how they could apply the strategies to other problems.

Teacher Guide Features

Part One and Part Two have identical formats and features.

PART ONE

PART TWO



1 **Annotated student book pages:** Provide a visual answer key for correcting student work.

2 **At a Glance:** Sums up the concept or skill students are practicing in each part of the practice.

3 **If:** Identifies a common pitfall—an error, misconception, or other difficulty—that may be leading students to an incorrect answer.

4 **Then:** Recommends a quick instructional tip for addressing the error or misconception and redirecting students.

3–4

Helpful teacher support

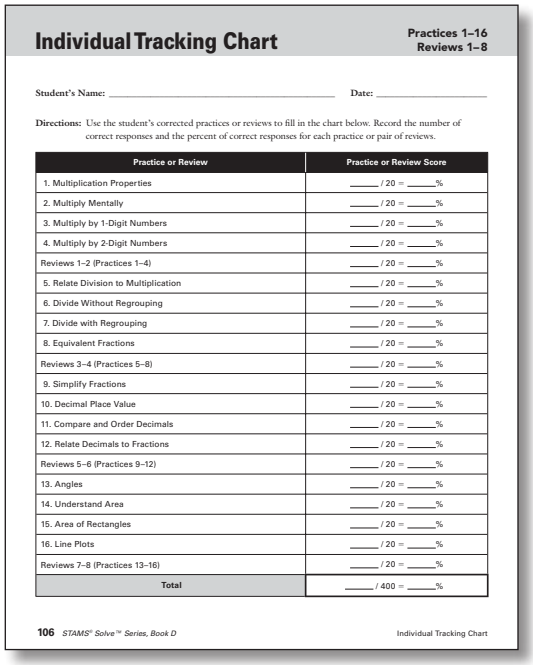
Each part of a practice has three or four sets of similar problems. Each set has a common pitfall (**If**) and a related instructional tip (**Then**) designed to help teachers monitor students' work.

- Have students solve the practice problems independently, but correct and review their work to make sure they are on track.
- Use the common pitfalls and related instructional tips to recognize and correct errors and misconceptions as they arise.
- If you notice that students are making the same mistake with problems in a set, intervene promptly to prevent them from repeating the error with other problems.

Using the Results of *Solve* to Remediate

Use the reproducible Individual Tracking Chart on page 106 of this teacher guide to record each student's performance in *Solve*. After correcting each student's practice or review, record the number of correct responses and the percent correct. Then use this data to make decisions about remediation.

If students are unsuccessful in solving the problems in a particular *Solve* Practice, use the Related *STAMS*® Instruction recommendations in this *Solve* teacher guide.



Individual Tracking Chart

Practices 1–16
Reviews 1–8

Student's Name: _____ Date: _____

Directions: Use the student's corrected practices or reviews to fill in the chart below. Record the number of correct responses and the percent of correct responses for each practice or pair of reviews.

Practice or Review	Practice or Review Score
1. Multiplication Properties	____ / 20 = ____%
2. Multiply Mentally	____ / 20 = ____%
3. Multiply by 1-Digit Numbers	____ / 20 = ____%
4. Multiply by 2-Digit Numbers	____ / 20 = ____%
Reviews 1–2 (Practices 1–4)	____ / 20 = ____%
5. Relate Division to Multiplication	____ / 20 = ____%
6. Divide Without Regrouping	____ / 20 = ____%
7. Divide with Regrouping	____ / 20 = ____%
8. Equivalent Fractions	____ / 20 = ____%
Reviews 3–4 (Practices 5–8)	____ / 20 = ____%
9. Simplify Fractions	____ / 20 = ____%
10. Decimal Place Value	____ / 20 = ____%
11. Compare and Order Decimals	____ / 20 = ____%
12. Relate Decimals to Fractions	____ / 20 = ____%
Reviews 5–6 (Practices 9–12)	____ / 20 = ____%
13. Angles	____ / 20 = ____%
14. Understand Area	____ / 20 = ____%
15. Area of Rectangles	____ / 20 = ____%
16. Line Plots	____ / 20 = ____%
Reviews 7–8 (Practices 13–16)	____ / 20 = ____%
Total	____ / 400 = ____%

106 *STAMS® Solve™ Series, Book D* Individual Tracking Chart

Level D, Teacher Guide

Correlation Charts

NCTM Focal Points and Connections The chart below indicates the practices in *Solve Book D* that provide instruction for the NCTM Focal Points and related Connections for grade 4.

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

Common Core State Standards The chart below correlates the practices in *Solve Book D* with the Common Core State Standards for grade 4 mathematics. For correlations to the Mathematical Practices, see the overview page of each *Solve* practice in this teacher guide.

Common Core State Standards for Grade 4 Mathematics	*Solve Book D*
Operations and Algebraic Thinking	
4.OA.1	Practice 1
4.OA.4	Practices 2, 9
Number and Operations in Base Ten	
4.NBT.1	Practices 2, 3, 4, 6, 7, 17, 18
4.NBT.4	Practices 6, 7
4.NBT.5	Practices 2, 3, 4, 5, 17
4.NBT.6	Practices 5, 6, 7, 18
Number and Operations—Fractions	
4.NF.1	Practices 8, 9, 12
4.NF.2	Practices 8, 9
4.NF.3	Practice 19

Common Core State Standards for Grade 4 Mathematics	*Solve Book D*
4.NF.4	Practice 19
4.NF.6	Practices 10, 12
4.NF.7	Practice 11
Measurement and Data	
4.MD.3	Practices 14, 15
4.MD.4	Practice 16
4.MD.5	Practice 13
Geometry	
4.G.1	Practice 13
4.G.2	Practice 13

PRACTICE 4

Parts One and Two

MULTIPLY BY 2-DIGIT NUMBERS

OBJECTIVES

In Part One, students will:

- Use place value and partial products to multiply two 2-digit numbers.
- Multiply by multiples of 10.

In Part Two, students will:

- Learn a quicker way for recording the partial products when multiplying two 2-digit numbers.
- Regroup ones as tens and tens as hundreds.

VOCABULARY

Part One

- **multiplier:** the number of groups in a multiplication
- **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

Part Two

- **regroup:** to use place value to trade amounts of equal value in a number, such as ones for tens or tens for ones; does not change the value of the number

CORRELATION TO COMMON CORE STATE STANDARDS

Number and Operations in Base Ten

- Use place value understanding and properties of operations to perform multi-digit arithmetic—4.NBT.5

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.

RELATED ADDITIONAL PRACTICE

After students have completed Practice 4, assign **Practice 17: Multiply 3-Digit Numbers,** pp. 83–85, to ensure coverage of Common Core State Standards related to multiplication.

RELATED *STAMS*® INSTRUCTION

For instruction that supports this practice, go to:

***STAMS*®, Book D, Lesson 4, Multiply by 2-Digit Numbers, pp. 34–43**

***STAMS*® Interactive Whiteboard Lessons, Level D, Visualize Multiplying by 2-Digit Numbers**
http://www.curriculumassociates.com/STAMS/IWB/

Use features such as drag and drop to deepen students' understanding of multiplying by a 2-digit number.

Name _____

PRACTICE 4

Part One

MULTIPLY BY 2-DIGIT NUMBERS

Use multiplication to solve the problem.

1. What is 24 × 63?

To multiply by a 2-digit number, find partial products for each digit of the **multiplier**. 24 is the multiplier in this problem.

63
× 24

1 2 ← 4 × 3 = 12 — Multiply 63 by the ones digit.

2 4 0 ← 4 × 60 = 240

6 0 ← 20 × 3 = 60 — Multiply 63 by the tens digit.

+ 1 2 0 0 ← 20 × 60 = 1200

1 5 1 2 ← Add the **partial products** to get the **product**.

Solution: 24 × 63 = 1,512

Solve the problem. Multiply. Fill in the blanks.

2.

27
× 36

4 2 ← 6 × 7 = 42

1 2 0 ← 6 × 20 = 120

2 1 0 ← 30 × 7 = 210

+ 6 0 0 ← 30 × 20 = 600

9 7 2 ← Add the partial products.

Solve each problem. Multiply. Show all the partial products and the product.

3.

72
× 16

1 2

4 2 0

2 0

+ 7 0 0

1 1 5 2

4.

38
× 25
40
150
160
+ 600
950

5.

43
× 29
27
360
60
+ 800
1,247

Multiply. Then match each product to a number in the box. If there is no match, check your work.

1,482 1,612 1,792

6.

62
× 26
12
360
40
+ 1,200
1,612

7.

78
× 19
72
630
80
+ 700
1,482

8.

56
× 32
12
100
180
+ 1,500
1,792

Solve each problem. Show your work.

9. In a small concert hall there are 38 rows of seats. Each row has 24 seats. How many seats are in the concert hall?

38
× 24
32
120
160
+ 600
912

Solution: 912 seats

10. How many inches are in 26 feet? (1 foot = 12 inches)

26
× 12
12
40
60
+ 200
312

Solution: 312 inches

At a Glance

Students solve a variety of multiplication problems by finding partial products. If students have difficulty, check for these common pitfalls and use the related tips to provide help.

Solve Problems 2–5

If If students write an incorrect product for problems 4 and 5, they may have written incorrect partial products and/or added the partial products incorrectly.

Then Remind students to use the place value of the digit in the factors for each partial product. Suggest that they write a multiplication sentence next to each partial product as shown in problems 1 and 2.

Solve Problems 6–8

If If students cannot match all their answers to the numbers in the box, they may not understand how to multiply two 2-digit numbers.

Then Check students' work. Then work with students to correct their errors.

Solve Problems 9–10

If If students write an incorrect answer for problem 9, they may not have included all the partial products.

Then Clarify for students that if there are two 2-digit factors, there should be four partial products.

Name _____

PRACTICE 4

Part Two

MULTIPLY BY 2-DIGIT NUMBERS

Let's solve this together.

Use multiplication to solve the problem.

1. What is 24 × 63?
Here is a quicker way to multiply a number by a 2-digit number. Follow the steps.

Step 1
Multiply by ones.
Regroup, if needed.

1
63
× 24
252 ← 4 × 63

Step 2
Multiply by tens.
Regroup, if needed.

63
× 24
252
1260 ← 20 × 63

Step 3
Add the partial products.

63
× 24
252 ← partial products
+ 1260 ← partial products
1512 ← product

Solution: 24 × 63 = 1,512

Solve each problem. Multiply. Show your work.

2. 42 × 19
378 ← 9 × 42
+ 420 ← 10 × 42
798

3. 64 × 35
320
+ 1920
2,240

4. 38 × 23
38
× 23
114
+ 760
874

Solve each problem. Choose the best answer.

5. 35 × 27
Ⓐ 245
Ⓑ 700
● 945
Ⓓ 1,045

6. A fourth-grade class of 24 students is going to an amusement park. The price of a student ticket is $32. What is the total cost of tickets for the whole class?
Ⓐ $128
Ⓒ $778
● $768
Ⓓ $868

7. 58 × 58
Ⓐ 464
Ⓒ 2,964
Ⓑ 754
● 3,364

8. How many ounces are there in 45 pounds? (1 pound = 16 ounces)
Ⓐ 360
Ⓒ 540
Ⓑ 450
● 720

Reasoning

Solve each problem. Explain your thinking.

9. Refer to number 6. Two students in the class are unable to attend. What is the total cost of tickets for the class and their teacher if an adult ticket costs $45?

Solution: $749

Explain how you found the answer.

There are two fewer students: 24 − 2 = 22.

I found the cost for the students by multiplying: $32 × 22 = $704.

Then, I added the price of the teacher's ticket: $704 + $45 = $749.

32
× 22
64
+ 640
704
+ 45
749

10. Suri and Josh solved the same problem: 27 × 45. Suri found the product 1,215. Josh found the product 1,212. By only looking at the products, and without calculating, who is incorrect? Explain.

Josh's answer is incorrect. If you multiply 27 by the ones digit in 45, the last digit should be a 5 because 7 × 5 = 35.

At a Glance

Students solve a variety of problems by using a multiplication algorithm. If students have difficulty, check for these common pitfalls and use the related tips to provide help.

Solve Problems 2–4

If If students write an incorrect product for problem 3, they may not have found the correct partial products.

Then Review with students that each partial product is the result of a 2-digit number times a 1-digit number.

Solve Problems 5–8

If If students choose C for problem 8, they may have incorrectly multiplied 45 by 12.

Then Clarify that there are 16 ounces, not 12 ounces, in a pound.

Reasoning, Problems 9–10

If Students who write an incorrect product for problem 9 may have had difficulty understanding the problem.

Then Reread both problems 6 and 9 with students. Ask some guided questions, such as: *How many students are going to the park in problem 9? How can you include the cost of the teacher's ticket?* Help students understand that this is a multi-step problem in which they must use addition and multiplication. Then help them articulate their thinking.

REVIEWS 1–2: PRACTICES 1–4

OBJECTIVES

In Review 1, students will:

- Use basic facts and patterns to mentally multiply 1-digit numbers by multiples of 10.
- Use mental math to multiply multiples of 10 by multiples of 10.
- Use a quicker algorithm for recording the partial products when multiplying a 2-digit number by a 1-digit number.
- Use a quicker algorithm for recording the partial products when multiplying two 2-digit numbers.
- Regroup ones as tens and tens as hundreds.

In Review 2, students will:

- Understand and apply the Commutative and Associative Properties of Multiplication.
- Use mental math to multiply 1-digit numbers and multiples of 10 by multiples of 10.
- Use quicker algorithms to multiply 2-digit numbers by 1- and 2-digit numbers.

VOCABULARY

Review 1

- **multiplication:** an operation used to find the total number of items in equal-sized groups

Review 2

- **Commutative Property of Multiplication:** a rule that states you can multiply factors in any order; the product is the same
- **Associative Property of Multiplication:** a rule that states you can change the grouping of 3 or more factors; the product is the same
- **factors:** the numbers you multiply to get a product
- **product:** the result of multiplying numbers together

CORRELATION TO COMMON CORE STATE STANDARDS

Number and Operations in Base Ten

- Use place value understanding and properties of operations to perform multi-digit arithmetic—4.NBT.5

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.

Name _____

REVIEW 1

REVIEW 1: PRACTICES 1–4

Solve each problem. Choose the best answer.

1. Which makes the sentence true?

$70 \times \square = 6{,}300$

Ⓐ 9
● 90
Ⓒ 900
Ⓓ 9,000

2. 96
× 7

Ⓐ 622
● 672
Ⓒ 722
Ⓓ 742

3. How many inches are there in 15 feet? (1 foot = 12 inches)

Ⓐ 45
Ⓑ 150
● 180
Ⓓ 540

4. Kayla bought 3 bags of buttons. There were 200 buttons in each bag. How many buttons did she buy in all?

Ⓐ 203
● 600
Ⓒ 3,200
Ⓓ 6,000

Mental Math **Match the multiplication problem with the correct answer. Solve as many problems as you can using mental math. Then solve the rest on paper. Show your work.**

5. 9×32
B — Student shows work.
1
32
× 9
288

6. 90×30
D

7. 58×39
F — Student shows work.
2
7
58
× 39
522
+ 1740
2,262

8. 7×400
E

9. 8×35
A — Student shows work.
4
35
× 8
280

10. 60×43
C
60
× 43
180
+ 2400
2,580

A 280
B 288
C 2,580
D 2,700
E 2,800
F 2,262

At a Glance

Students solve a variety of multiplication problems by using mental math and multiplication algorithms. If students have difficulty, check for these common pitfalls and use the related tips to provide help.

Solve Problems 1–4

If If students choose A, C, or D for problem 2, they may not fully recall the steps involved to multiply a 2-digit number by a 1-digit number.

Then Review the multiplication algorithm in Practice 3 Part Two with students. Remind students to include the regrouped 4 tens in the final answer. If students are still struggling, have them use the partial products method shown in Practice 3 Part One.

Mental Math, Problems 5–10

If If students choose incorrect answers for problems 8 and 9, they may have forgotten the importance of place value in the multiplication process.

Then Review with students how to multiply with multiples of 10 (Practice 2) and how to multiply a 2-digit number by a 1-digit number (Practice 3). Emphasize the importance of place value in both methods.

Name _____

REVIEW 2

REVIEW 2: PRACTICES 1–4

Students should show their work for numbers 1 and 4.

Mental Math **Solve each problem using mental math or pencil and paper. Show your work if you do not use mental math.**

1. A case of soup has 24 cans. Greg unpacked 7 cases in the store. How many cans of soup did he unpack?

   Solution: 168

   $$\begin{array}{r} {\scriptstyle 2} \\ 24 \\ \times\ 7 \\ \hline 168 \end{array}$$

2. Alisha made 5 cans of soup for a group. The soup in each can has a mass of about 300 grams. About how many grams of soup did she make in all?

   Solution: 1,500

3. How many minutes are there in 20 hours? (1 hour = 60 minutes)

   Solution: 1,200

4. A store ordered 36 boxes of crayons. There are 48 crayons in each box. How many crayons are there in all?

   Solution: 1,728

   $$\begin{array}{r} {\scriptstyle 2\ 4} \\ 36 \\ \times\ 48 \\ \hline 288 \\ +\ 1440 \\ \hline 1,728 \end{array}$$

Solve the problem. Fill in the blanks with numbers or with words from the box.

Associative	Commutative	Distributive
grouping	number	order

5. Using the Commutative Property of Multiplication, you can change the order of the factors and the product is still the same.

   Problem: 83 × 19 = 19 × 83

   Product: 1,577 = 1,577

   Using the Associative Property of Multiplication, you can change the grouping of the factors and the product is still the same.

   Problem: 2 × (5 × 47) = (2 × 5) × 47

   Product: 470 = 470

Solve each problem. Choose the best answer.

6. Which makes the sentence true?

   35 × 69 = ■

   Ⓐ 104 Ⓒ 36 × 59

   Ⓑ 3,569 ● 69 × 35

7. What is 72 × 86?

   Ⓐ 158 Ⓒ 774

   Ⓑ 172 ● 6,192

Reasoning

Solve each problem. Explain your thinking.

8. Jackson solved the multiplication problem below. Did he find the correct product? Explain why or why not.

   $$\begin{array}{r} 46 \\ \times\ 25 \\ \hline 230 \\ +\ 92 \\ \hline 322 \end{array} \qquad \begin{array}{r} 46 \\ \times\ 25 \\ \hline 230 \\ +\ 920 \\ \hline 1,150 \end{array}$$

   No. The first partial product is correct, but the second partial product should be 920. It is the product of 20 × 46, not 2 × 46. The correct product is 1,150.

9. Ali did the problem 80 × 50 and got a product of 4,000. Andy did the same problem and got a product of 400. Who is correct? Explain why.

   Ali is correct because he multiplied the basic fact 8 × 5 = 40. Since there are 2 zeros in the factors, he placed 2 zeros after the 40 to get 4,000.

10. Find the solution using the digits 6, 7, 8, and 9. Use each digit only once.

    $$\begin{array}{r} \square\square \\ \times\ \square\square \\ \hline 6,003 \end{array}$$

    69 × 87 or 87 × 69

    Explain how you solved the puzzle.

    I looked at the ones digit of the product. In order to get a 3, I needed to multiply 9 and 7 (9 × 7 = 63). So, I knew that the ones digits had to be 9 and 7. Since 6 and 8 were left, I tried 89 × 67 and 69 × 87. 89 × 67 = 5,963; 69 × 87 = 6,003 is correct.

At a Glance

Students solve multiplication problems by using mental math, multiplication properties, and multiplication algorithms. If students have difficulty, check for these common pitfalls and use the related tips to provide help.

Mental Math, Problems 1–4

If If students write an incorrect product for problem 4, they may not recall how to multiply two 2-digit numbers.

Then Remind students of the meaning of partial products. Help them see that the sum of the partial products is the final answer.

Solve Problem 5

If Students who write an incorrect word in any of the blanks may not fully recall the properties of multiplication.

Then Review both properties. Refer students to problem 1 in each part of Practice 1 for visual explanations.

Solve Problems 6–7

If Students who choose A for problem 6 may have added instead of multiplied.

Then Encourage students to be observant of which operation is used. Point out the multiplication symbol in the problem.

Reasoning, Problems 8–10

If If students cannot find the solution for problem 10, they may not be approaching the problem strategically.

Then To help students get started, guide them to think of multiples, especially a multiple with a 3 in the ones place.