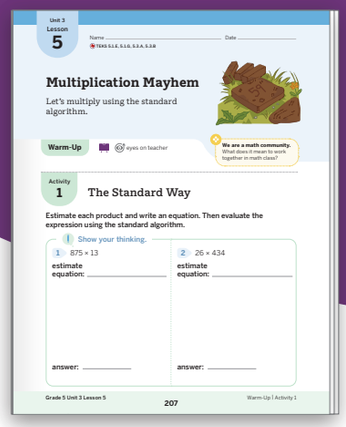
Unit 3
Lesson
5

Student Edition pages and Presentation Screens support learning in this lesson.


Unit 3 Lesson 5

Name _____ Date _____

TEKS 5.1.E, 5.1.G, 5.3.A, 5.3.B

Multiplication Mayhem

Let's multiply using the standard algorithm.

Warm-Up

eyes on teacher

We are a math community. What does it mean to work together in math class?

Activity 1

The Standard Way

Estimate each product and write an equation. Then evaluate the expression using the standard algorithm.

Show your thinking.

1 875 × 13

estimate

equation: _____

answer: _____

2 26 × 434

estimate

equation: _____

answer: _____

Grade 5 Unit 3 Lesson 5 207 Warm-Up | Activity 1

Multiplication Mayhem

Multi-Digit Multiplication Fluency

Let's multiply using the standard algorithm.

Key Concepts

Today's Goals

1. **Goal:** Fluently multiply a three-digit number by a two-digit number using the standard algorithm.
2. **Language Goal:** Explain how the standard algorithm can be used to attend to the place value of regrouped values. **(Listening and Speaking)** ELPS 1.E, 2.E, 2.F

Connections and Coherence

Students use the standard algorithm to evaluate three-digit by two-digit multiplication expressions where regrouping is necessary in multiple places. They ensure they attend to place value by organizing their work and estimating the products. Students then create and evaluate multiplication expressions in which regrouping is necessary in multiple places, reinforcing their understanding of how and why regrouping is used. They explain how the standard algorithm can be used to attend to the place value of regrouped values using precise language. **(TEKS 5.1.E, 5.1.G)**

Prior Learning

In Lesson 4, students used partial products to evaluate multi-digit multiplication expressions.

Future Learning

In Sub-Unit 2, students will divide with multi-digit divisors using what they know about place value. In Lesson 6, students will review what they know about division and estimate the place value of the quotient.

Integrating Rigor in Student Thinking

- Students build **fluency** with three-digit by two-digit multiplication using the standard algorithm.

Vocabulary

Review Vocabulary

factor

partial product

product

regroup

TEKS

Addressing

5.3.B

Multiply with fluency a three-digit number by a two-digit number using the standard algorithm.

Also Addressing: 5.3.A

Math Process Standards: 5.1.C, 5.1.D, 5.1.E, 5.1.G

ELPS: 1.E, 2.B, 2.C, 2.D, 2.E, 2.F

Building On	Building Toward
4.4.D	6.3.E

Building Math Identity

We are a math community.
What does it mean to work together in math class?

Invite students to reflect on this question as they complete this lesson.

Lesson at a Glance

60 min

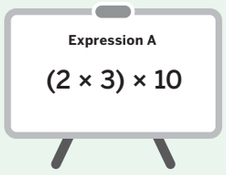
TEKS: 5.1.C, 5.1.D, 5.1.E, 5.1.G, 5.3.A, 5.3.B

Warm-Up

Fluency

Whole Class | 10 min

Students use the **Number Talk** routine, in which they look for structure and use repeated reasoning based on their own previous strategies or the strategies of others as they study a sequence of multiplication expressions that lend themselves to the Distributive Property. **(TEKS 5.1.C, 5.1.D)**



Activity 1

Fluency

Pairs | 15 min

Students use the standard algorithm to evaluate three-digit by two-digit expressions where regrouping is necessary for 1 digit in the second factor. They explain how they used the standard algorithm to organize their work and evaluate the reasonableness of their answers using estimates.

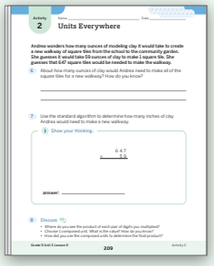
Activity 2

Fluency

Pairs | 20 min

Students use the standard algorithm to evaluate three-digit by two-digit expressions when regrouping is necessary for both digits in the second factor. They apply their work with the standard algorithm to create and evaluate a multiplication expression that results in at least 3 regrouped values.

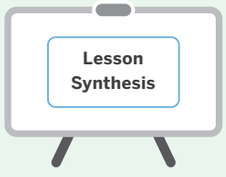
Materials: *Standard Algorithm: Place Value Template* PDF (as needed)



Synthesis

Whole Class | 10 min

Students review and reflect on what they now know about multiplication after having completed this sub-unit.

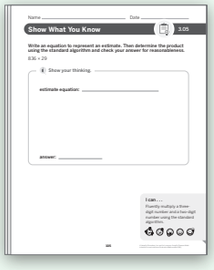


Show What You Know

Independent | 5 min

Students demonstrate their understanding by estimating and evaluating a three-digit by two-digit multiplication expression using the standard algorithm.

Materials: *Show What You Know PDF*



Math Language Development

Emergent Bilinguals

Consider using the *Math Language Development Resources* with the **Activity 1, Monitor** to support math language acquisition.

✓ Cognates ✓ Sentence frames and word bank

ELPS 1.E, 2.C, 2.D, 2.E, 2.F

Pre-Production	Beginning	Intermediate	High Intermediate	Advanced
Students **listen** to spoken English and **respond** using their primary languages and gestures.	Students **listen** to spoken English and **speak** using their primary languages, gestures, and single words or short phrases.	Students **listen** to spoken English and **speak** using short phrases or simple sentences.	Students **listen** to spoken English and **speak** using a variety of sentence types.	Students **listen** to spoken English and **speak** using longer sentences. Exemplar responses are provided.

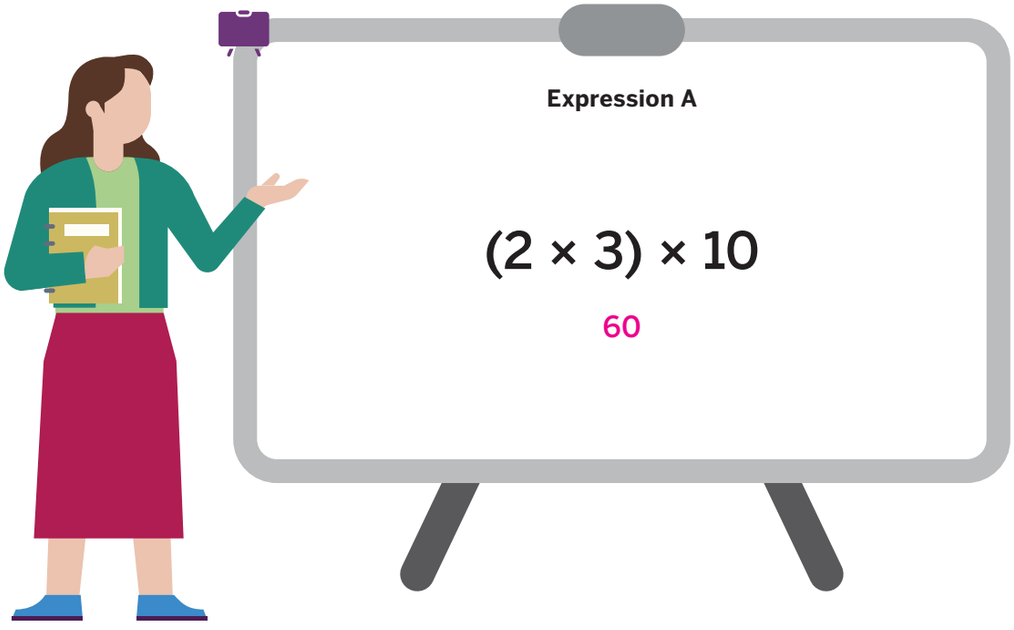
Whole Class | 10 min

Presentation Screen

Warm-Up Number Talk

Fluency

Purpose: Students use strategies such as place value and properties of operations to multiply 3 factors, where 1 factor is 10, to prepare for using the standard algorithm fluently.



Expression B

(2 × 40) × 10

800

Expression C

(2 × 200) × 10

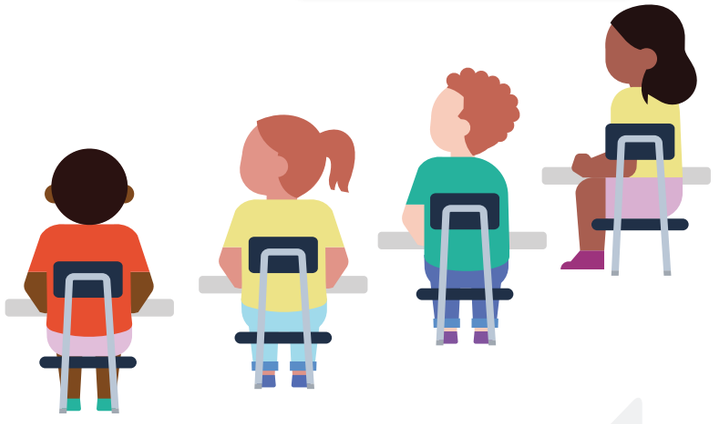
4,000

Expression D

(2 × 243) × 10

4,860

Why these problems? These expressions lend themselves to using the Distributive Property to determine a product using previous calculations.



1 Launch

Use the Number Talk routine.

Display 1 expression at a time.

Say, "Take your time to find the value mentally. Give me a signal when you have an answer and can explain how you determined it."

2 Connect

Record products and 2 or 3 strategies as students share, honoring all strategies and keeping expressions and work displayed.

Repeat with each expression, spending the most time discussing Expression D.

Ask How did Expressions A–C help you evaluate Expression D?

Students might say . . . ELPS 2.C, 2.D, 2.E

A: I know 2 × 3 = 6 and 10 × 6 = 60.

B: 2 groups of 40 is 80, and 10 × 80 = 800.

C: 2 × 200 is 400, and 10 × 400 is 4,000.

D: Because 243 is the same as 200 + 40 + 3, I know the sum of (2 × 3) + (2 × 40) + (2 × 200) is 486. 10 × 486 = 4,860

Pairs | 15 min

Activity 1 The Standard Way

Fluency

Purpose: Students estimate and evaluate three-digit by two-digit multiplication expressions using the standard algorithm to build fluency.

Presentation Screens

Short on time? Consider completing Problems 3 and 6 as a class.

1 Launch

Display the partial products strategy and the standard algorithm strategy.

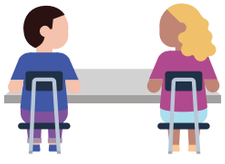
Use the Think-Pair-Share routine. Ask:

- "What is similar about the strategies?"
- "What is different about the strategies?"

Say, "Today, you will evaluate three-digit by two-digit multiplication expressions using the standard algorithm. Work with your partner to complete Problems 1–4. Join another pair to discuss Problem 5."

EB **Emergent Bilinguals** Encourage pairs to explain to their partner how they will evaluate and record each step in the standard algorithm. ELPS 1.E, 2.B, 2.D, 2.F

2 Monitor



After students have completed **Problem 1**, refer to the D Differentiation | Teacher Moves table on the following page.

If students need help getting started . . .

- Ask, "How will you set up the problem to evaluate it?"
- Ask, "Which digits should you multiply first?"

3 Connect

Invite students to share their responses to Problem 1.

MLR **MLR8: Discussion Supports — Active Listening** ELPS 1.E, 2.F

Invite students to begin partner interactions by restating their partner's description, in their own words, before adding their own ideas to the discussion. Encourage them to use vocabulary terms, such as *factor*, and high-frequency words, such as *estimate* and *organize*.

Use the Think-Pair-Share routine. Ask:

- "How did the standard algorithm help you keep track of your work?"
- "How did you organize the regrouped values? Why does that make sense?"
- "How might you organize your work if you had to regroup every time?"

Key Takeaway: Say, "The standard algorithm is useful when evaluating multi-digit multiplication expressions because no matter how many digits there are in the factors, the steps to evaluate remain the same. Estimating before evaluating helps you to check your work during each step of the algorithm."

Student Edition

Unit 3 Lesson 5

Name _____ Date _____

TEKS 5.1.E, 5.1.G, 5.3.A, 5.3.B

Multiplication Mayhem

Let's multiply using the standard algorithm.

Warm-Up eyes on teacher

We are a math community. What does it mean to work together in math class?

Activity 1 The Standard Way

Estimate each product and write an equation. Then evaluate the expression using the standard algorithm.

Show your thinking. Sample equations and work shown.

1 875 × 13

estimate equation: 900 × 10 = 9,000

```
  21
 875
×  13
2,625
+ 8,750
11,375
```

answer: 11,375

2 26 × 434

estimate equation: 30 × 400 = 12,000

```
 222
 434
×  26
2,604
+ 8,680
11,284
```

answer: 11,284

Name _____ Date _____

The Standard Way (continued)

Show your thinking. Sample equations and work shown.

3 102 × 93

estimate equation: 100 × 90 = 9,000

```
  1
102
× 93
306
+ 9,180
9,486
```

answer: 9,486

4 223 × 62

estimate equation: 200 × 60 = 12,000

```
 111
223
× 62
446
+ 13,380
13,826
```

answer: 13,826

5 Discuss

- How did you organize your work using the standard algorithm?
- How did you use estimation to check that your work was reasonable as you solved?

Oral activity: No writing expected. Sample response shown.

I organized my work by showing the multiplication of the first factor by the ones place of the second factor. Then I showed the multiplication of the first factor by the tens place of the second factor. When multiplying, I organized the regrouped values above each place value. To check my work, I made sure it was close to my estimate.

Presentation Screens

D Differentiation | Teacher Moves

Look for students who . . .	For example . . .	Provide support . . .
Almost there Multiply each digit in the second factor as ones.	21 875 × 13 2625 + 875 3,500	**Support** Ask, "What is the value of the 1 in the factor 13? How could you represent this in your work?"
Almost there Multiply each digit in the second factor according to its place value and record regrouped values within the product.	875 × 13 242115 + 8750	**Support** Say, "The standard algorithm helps you organize your work by place value. When the product of 2 factors creates a regrouped value, you record it above the next place value."
Multiply each digit in the second factor and record regrouped values according to their place value.	21 875 × 13 2,625 + 8,750 11,375	**Stretch** Ask, "How might you organize your work if you had to regroup in the tens place of the second factor?"

Pairs | 20 min

Activity 2 Regrouping Everywhere

Fluency

Purpose: Students use their understanding of place value and the standard algorithm to evaluate three-digit by two-digit multiplication expressions in which regrouping is necessary for both places of the second factor.

Presentation Screens

Materials

Lesson Resources:

- Provide students with access to the *Standard Algorithm: Place Value Template* PDF (as needed).

1 Launch

Read aloud the introduction. ELPS 1.E

Say, "You will complete Problems 6 and 7 independently. Then complete Problem 8 with your partner."

Say, "Let's look at Problem 9 together."

Use the Think-Pair-Share routine. Ask, "What are some digits you might choose to use in your expression? Why?"

Say, "Complete Problems 9–11 with your partner."

A **Accessibility: Conceptual processing** Provide access to the *Standard Algorithm: Place Value Template* PDF as students complete Problems 7 and 9.

2 Monitor

After students have completed **Problem 8**, refer to the D Differentiation | Teacher Moves table on the following page.

If students need help getting started . . .

- Ask, "Which digits should you multiply first?"
- Ask, "Which 2 digits when multiplied will require you to regroup? How do you know?"

EB **Emergent Bilinguals** As students respond to the Discuss prompts, monitor their responses for increasing specificity, such as stating the digits they used, and increasing detail, such as describing how they determined the final product. ELPS 3.E

3 Connect

Invite students to share their responses to Problem 7. Encourage them to share connections between the products of each pair of digits they multiplied and the value of each digit they recorded.

Use the Think-Pair-Share routine. Invite students to speak using informal language and monitor their responses for increasing accuracy and fluency. Ask: ELPS 2.D

- "How did you keep track of multiple regrouped values in Problem 7?"
- "How can you use known multiplication facts to predict the number of places you will need to record regrouped values?"
- "Why might it be helpful to consider where regrouping will be necessary before evaluating a multiplication expression?"

Key Takeaway: Say, "When using the standard algorithm, regrouping may be necessary in multiple places. You can keep track of the regrouped values by recording them using your place value understanding."

Activity 2

Name ______ Date ______

Regrouping Everywhere

Andrea wonders how many ounces of modeling clay it would take to create a new walkway of square tiles from the school to the community garden. She guesses it would take 59 ounces of clay to make 1 square tile. She guesses that 647 square tiles would be needed to make the walkway.

6 About how many ounces of clay would Andrea need to make all of the square tiles for a new walkway? How do you know?

Sample response shown.

About 36,000 ounces of clay because I rounded 59 to 60 and 647 to 600 and 60 × 600 = 36,000.

7 Use the standard algorithm to determine how many inches of clay Andrea would need to make a new walkway. Sample work shown.

Show your thinking.

```
  323
  5̸4̸6̸
   647
×   59̸
 5 823
+32,350
 38,173
```

answer: 38,173 ounces of clay

8 Discuss Oral activity: No writing expected.

- Where do you see the product of each pair of digits you multiplied?
- Choose 1 regrouped value. What is the value? How do you know?
- How did you use the regrouped values to determine the final product?

Activity 2

Name ______ Date ______

Regrouping Everywhere (continued)

9 Write a multiplication expression for your partner to evaluate. There must be:

- 2 factors.
- 1 factor with 3 digits and 1 factor with 2 digits.
- Regrouping in at least 2 places.

Sample responses shown for Problems 9 and 10.

my expression: 877 × 65 estimate: 900 × 70 = 63,000

my partner's expression: 596 × 74 estimate: 600 × 70 = 42,000

10 Evaluate your expression and your partner's expression from Problem 9 using the standard algorithm.

Show your thinking.

My expression	My partner's expression
544 4̸3̸3̸ 877 × 65̸ 4,385 + 52,620 57,005	464 2̸3̸2̸ 596 × 74̸ 2,384 + 41,720 44,104
answer: 57,005	answer: 44,104

11 Discuss Oral activity: No writing expected.

- Which digits did you use to write your multiplication expressions? Why?
- How did you record any regrouped values? What is their value?

Presentation Screens

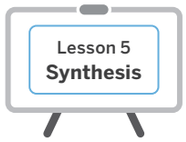
D Differentiation | Teacher Moves

Look for students who . . .	For example . . .	Provide support . . .
Explain their thinking using known facts.	I multiplied 9 × 7, and recorded 6 and 3. I multiplied 9 × 4, and recorded 3 and 6. I multiplied 9 × 6 and recorded 5 and 4.	**S Strengthen** Ask, "What is the value of each digit that you recorded? How do you know?"
Explain their thinking using place value understanding.	• 9 × 7 is 63, so I recorded the 3 in the ones place and the 6 in the tens place. • 9 × 4 tens is 36 tens, so I recorded the 6 in the tens place and the 3 in the hundreds place. • 9 × 6 hundreds is 54 hundreds, so I recorded the 4 in the hundreds place and the 5 in the thousands place.	**S Stretch** Ask, "How would your thinking stay the same or change if the second factor was 359?"

Whole Class | 10 min

Synthesis

Presentation Screens



Lesson Takeaway: Using the standard algorithm to solve multi-digit multiplication problems helps to organize all of the partial products and regrouped values in an efficient way. Estimating before solving is helpful in monitoring work and checking that the place value of each partial product is accurate.

Use the Think-Pair-Share routine. Invite students to reflect on everything they have learned about multiplication and to use the sentence frames to structure their reflection.

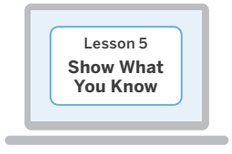
Say, "In this sub-unit, you built on familiar strategies and representations of multiplication to multiply greater multi-digit numbers, and you expanded your representations to include the standard algorithm. In future lessons, remember that you can choose a strategy based on what is most efficient for you. No matter which strategy you choose, it is important to attend to precision and place value."

Invite students to refer to the **Summary** during Practice or anytime during the year.

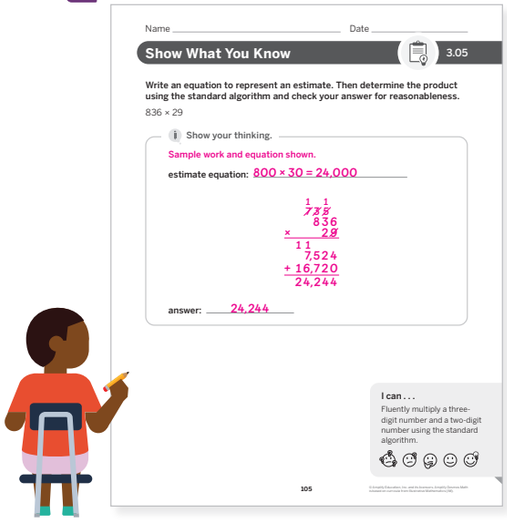
Show What You Know

Independent | 5 min

Students using digital



Show What You Know PDF


Name _____ Date _____

Show What You Know 3.05

Write an equation to represent an estimate. Then determine the product using the standard algorithm and check your answer for reasonableness.

836 × 29

Show your thinking.

Sample work and equation shown.

estimate equation: 800 × 30 = 24,000

$$\begin{array}{r} {\scriptstyle 1\ 1}\\ 836\\ \times\ \ 29\\ \hline 7,524\\ +\ 16,720\\ \hline 24,244 \end{array}$$

answer: 24,244

I can . . .
Fluently multiply a three-digit number and a two-digit number using the standard algorithm.

105

Today's Goals

1. **Goal:** Fluently multiply a three-digit number by a two-digit number using the standard algorithm.
   - In the *Show What You Know*, students multiplied a three-digit by two-digit number using the standard algorithm.
2. **Language Goal:** Explain how the standard algorithm can be used to attend to the place value of regrouped values. **(Listening and Speaking)** ELPS 1.E, 2.E, 2.F

Differentiation See the last page of the lesson for differentiation and Math Language Development support.

Practice

Independent

Provide students with sufficient practice to build and reinforce their conceptual understanding, fluency, and application of mathematical topics, assessment practice, and ongoing spiral review.

Lesson 5
Practice

Students using digital

Students using print

Summary 3.05

Using the standard algorithm to solve multi-digit multiplication problems helps to organize all of the partial products and regrouped values in an efficient way. Estimating before solving is helpful in monitoring work and checking that the place value of each partial product is accurate.

Estimation	Standard algorithm
300 × 10 = 3,000	32 ← regrouped values 295 × 14 1,180 ← partial products + 2,950 4,130

Practice 3.05

1 Determine the product of the expression 477 × 53 using the standard algorithm.

Record your answer in the space provided.

25,281

Grade 5 Unit 3 Lesson 5 211 Summary | Practice

Practice 3.05

Name _____ Date _____

For Problems 2 and 3, estimate the product and write an equation. Then determine the product using the standard algorithm.

Show your thinking. Sample equations and work shown.

2

estimate equation: 300 × 40 = 12,000

1
13
325
× 36
1,950
+ 9,750
11,700

answer: 11,700

3

estimate equation: 500 × 70 = 35,000

25
37
549
× 68
4,392
+ 32,940
37,332

answer: 37,332

4 1 bag of red wiggler worms, which are used for composting, is sold for $44. A sustainable farm purchases 125 bags of worms. Estimate the product and write an equation. Then determine the total cost of the worms.

Show your thinking. Sample equation and work shown.

estimate equation: 130 × 40 = 5,200

12
12
125
× 44
500
+ 5,000
5,500

answer: $5,500

Grade 5 Unit 3 Lesson 5 212 Practice

Practice 3.05

Name _____ Date _____

5 Diego evaluated the expression 727 × 42. His work is partially shown. Help Diego by completing his work and determining the product.

30,534

Diego's work

12
1 1
727
× 42
1,454
+ 29,080
30,534

Spiral Review

6 Simplify the expression 123(15) ÷ (5.56 + 3.44).

Show your thinking. Sample work shown.

11
123
× 15
615
+ 1230
1,845

11
5.56
+ 3.44
9.00

205
9)1845
−18
045
− 45
0

answer: 205

For Problems 7 and 8, determine the value of the expression.

7 6,720 ÷ 6

1120
6)6720
−6
07
− 6
12
− 12
00

answer: 1,120

8 6,318 ÷ 9

702
9)6318
−63
001
− 0
18
− 18
00

answer: 702

Grade 5 Unit 3 Lesson 5 213 Practice

Practice Problem Item Analysis

	Problem(s)	DOK	TEKS
On-Lesson			
Test Practice	1	1	5.3.B
Fluency	2–4	1	5.3.A, 5.3.B
Fluency	5	2	5.3.A, 5.3.B
Spiral Review			
	6	2	5.4.F
Fluency	7, 8	1	4.4.D

Need more Practice?

Additional practice can be found in the **Practice Resources, Intervention and Extension Resources,** and online resources (item banks, Boost Personalized Learning, and Fluency Practice).

Differentiation Use after Lesson 5

Lesson Goal: Fluently multiply a three-digit number by a two-digit number using the standard algorithm.

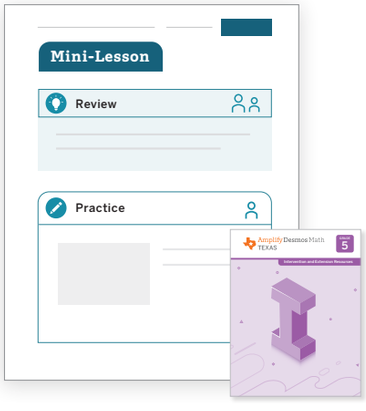
Support

Provide targeted intervention for students by using these resources.

If students evaluate without attending to place value:

Respond:

- Assign the *Multi-Digit Multiplication Fluency* Mini-Lesson. | 15 min
- Review the standard algorithm steps.



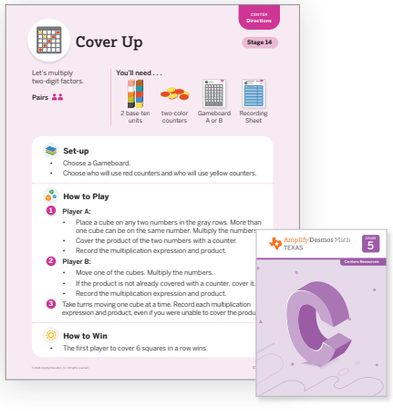
Strengthen

Reinforce students' understanding of the concepts assessed by using these resources.

If students evaluate using their place value understanding to regroup:

Respond:

- Invite students to play these **Centers**. | 15 min
  Cover Up: Two-Digit Factors
  Equation Challenge:
  - *Two-Digit Factors*
  - *Multi-Digit Factors*
- Have students complete **Lesson 5 Practice**. | 15 min
- **Item Bank**



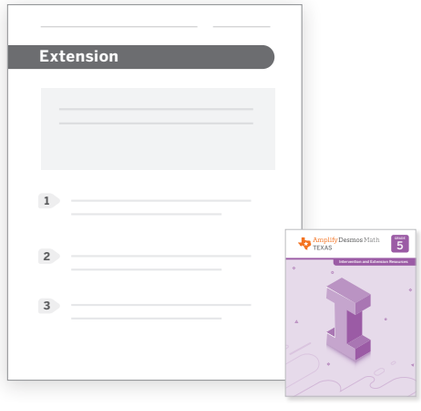
Stretch

Challenge students and extend their learning with these resources.

If students fluently evaluate using their place value understanding to regroup:

Respond:

- Invite students to explore the **Sub-Unit 1 Extension Activities.** | 15 min
- Revisit Activity 2 and invite students to respond to the **Stretch** question from the *Differentiation: Teacher Moves* table. | 5 min



Support, *Strengthen*, and *Stretch* learning by assigning these digital resources that adjust to each student's current level of skill and understanding.
• **Boost Personalized Learning** • **Fluency Practice** • **Math Adventures**

Math Language Development

EB Use the ***Math Language Development Resources*** for further language support with all your students, including those building English proficiency.

- English/Spanish cognates, e.g., *product/el producto*
- Frayer Model templates
- Vocabulary routines

Professional Learning

Reflect on a recent time that your thinking changed about something in class. How will you alter your teaching practice to incorporate your new understanding?

Notes: