Multiply Multi-Digit Numbers Fluently

Teacher		**Class**	Grade 5
Subject	Math	**Topic**	Multi-digit multiplication
Date		**Room**	
Lesson length	60 minutes	**Country**	United States

Students learn to fluently multiply multi-digit whole numbers with the standard algorithm. They practice place value steps, then race in teams to solve and check products.

Curriculum links

- Determine the product of two numbers using strategies and algorithms for multiplication [1]
- Estimate the result of addition, subtraction, multiplication, and division problems [1]
- developing fluency with whole number and decimal operations [2]

Learning objectives

- Students will fluently multiply 2-digit by 2-digit numbers using the standard algorithm.
- Students will multiply 3-digit by 2-digit numbers using regrouping and place value.
- Students will use estimation with round numbers to check if products are reasonable.

Success criteria

- I can regroup correctly and line up digits by place value.
- I can write the placeholder zero and add both rows for the product.
- I can estimate first and check that my exact answer is reasonable.

What students already know

Ask quickly: What is 6 x 4? What is 20 x 30? What does 3 x 200 mean? Listen for basic facts and multiples of 10.

Key words

factor	a number that is multiplied by another number
product	the answer you get after multiplying numbers together
regroup	to trade 10 ones for 1 ten in the next spot
placeholder zero	a 0 in the second row that keeps every digit in the correct spot [3]
estimate	a close guess using round numbers to check if an answer makes sense [1]
standard algorithm	a short stacked way to multiply using place value [3]

Materials

- Slides 1-12
- Video clip 3 2-Digit by 2-Digit Standard Algorithm
- task cards with problems
- team recording sheets
- pencils
- basic facts chart

Before the lesson

- Print task cards for 23 x 15, 36 x 42, 56 x 38, 29 x 41 and challenge 245 x 32
- Print team recording sheets and copies of Worksheet Tasks A and B
- Test Video clip 3 (0:00-4:54) and Slides 1, 5, 7, 9-12

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- Worksheet Task A and Task B
- whiteboards, markers, erasers
- Set up four stations with space to walk and clear aisles with backpacks under desks

Lesson outline

0–5 min **Starter** 5 min · Whole class

To recall basic facts and hook students on fluent, accurate relay solving.

YOU DO

1. Show Slide 1 and say the relay hook to the class.
2. Show Slide 5 and take a quick vote on what trips students up most.
3. Flash oral facts: 6 x 4, 7 x 8, 20 x 3, 30 x 40 for quick recall.
4. Explain teams of four will each do one step: multiply, regroup, shift, add.

STUDENTS DO

1. Vote for what is hardest and raise hands.
2. Answer basic facts aloud.
3. Listen to relay roles and move eyes to stations.

Say: Grab a card, solve one step, pass it on — can your team finish all four stations with no regrouping mistake? Today we will fluently multiply 2-digit by 2-digit numbers and bigger numbers. First vote, warm up facts, then learn the four steps.

Ask: What is 30 x 40, and how do you know? (1,200, because 3 x 4 = 12, then add two zeros.) · Is 29 x 41 closer to 800 or 1,200? (1,200, because 30 x 40 = 1,200 [1].)

Check understanding: Quick thumbs up if you can do 7 x 8 and 20 x 30; reteach with facts chart if many are unsure.

Support: Point to the basic facts chart for 6 x 4 and 7 x 8 so students join in. **Stretch:** Ask to explain why 30 x 40 is a good estimate for 29 x 41.

Use: Slides 1, 5

5–20 min **Teaching** 15 min · Whole class

To model the four steps of the standard algorithm with place value.

YOU DO

1. Review key words on Slide 7: factor, product, regroup, placeholder zero.
2. Play Video clip 3 (0:00-4:54) and ask students to spot regrouping and adding rows.
3. Model 23 x 15 on the board using the 4 steps, circling regrouped digits.
4. Explain the shortcut records the same partial products in shorter form based on place value [3].

STUDENTS DO

1. Say the four steps with the teacher and track with fingers.
2. Copy 23 x 15 stacked form and circle the carry and placeholder zero.
3. Tell a partner where 115 and 230 come from.

Say: We multiply every place value, then add it all. First we multiply by the ones and regroup if needed. Then we write 0 to hold the tens place before we multiply by the tens, then add both rows [3].

Worked example: 23 x 15 = 345. Step 1: 5 x 3 = 15, write 5 carry 1. 5 x 2 = 10 + 1 = 11, so row one is 115. Step 2: write 0 to hold tens place. Step 3: 1 x 3 = 3, 1 x 2 = 2, so row two is 230, which is 10 x 23. Step 4: 115 + 230 = 345.

Ask: Where does the 0 in the second row come from? (We are now multiplying by 10, so 0 holds the tens place [3].) · What is 5 x 23 and what is 10 x 23 in this problem? (115 and 230, and 115 + 230 = 345.) · How do we check if 345 is reasonable? (Estimate 20 x 15 = 300, so 345 is close [1].)

Check understanding: Hold up whiteboards showing row one 115 and row two 230; re-model regrouping if row one is wrong.

Support: Give a place-value checklist: multiply ones, regroup, write 0, multiply tens, add rows. **Stretch:** Ask students to predict what changes for 230 x 15 if the factor were 230.

Use: Video clip 3 (0:00–4:54), Slides 3–4, 7, 10

20–30 min **Guided practice** 10 min · Pairs

To practice 2-digit and 3-digit by 2-digit problems together with estimation.

YOU DO

1. Hand out Worksheet Task A and show the 4 steps again.
2. Solve 23 x 14 together: estimate 20 x 15 = 300, then solve exactly.
3. Solve 143 x 32 together: estimate 140 x 30 = 4,200, then solve exactly.
4. Ask pairs to point to regroup marks and the placeholder zero.

STUDENTS DO

1. Estimate with partner, then solve 23 x 14 and start 143 x 32 on Task A.
2. Circle regrouped digits and underline the placeholder zero.

Say: Estimate first, then solve exactly with the standard algorithm. With your partner, say each step before you write it. Line up digits neatly by place.

Worked example: 143 x 32 = 4,576. Estimate 140 x 30 = 4,200 [1]. Row one: 2 x 143 = 286. Write 0, then row two: 30 x 143 = 4,290. Add: 286 + 4,290 = 4,576.

Ask: What is a good estimate for 143 x 32? (About 4,200 because 140 x 30 = 4,200 [1].) · In 143 x 32, what does the 3 in 32 really multiply? (30, so 30 x 143 = 4,290.)

Check understanding: Check boards for 23 x 14 = 322; if adding rows is wrong, redo step 4 together.

Support: Provide a worked example to copy numbers from and sentence starters for each step. **Stretch:** Ask pairs to explain where the extra thousand goes when regrouping in 143 x 32.

Use: Worksheet Task A, Slides 10–11

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30–50 min **Main activity** 20 min · Groups

To build fluency solving 2-digit by 2-digit problems with the standard algorithm.

YOU DO

1. Send teams to four stations: 23 x 15, 36 x 42, 56 x 38, 29 x 41 with recording sheets.
2. Assign each student the next step: multiply, regroup, shift with zero, add.
3. Remind teams to walk, keep aisles clear, estimate first then solve exactly.
4. Rotate stations every 4 minutes and check that regroup marks and zeros are shown.

STUDENTS DO

1. Rotate to stations, estimate, then solve each problem with all steps shown.
2. Take turns for each step and circle regrouped digits on the team sheet.

Say: First estimate, then solve with the stacked steps. Each person completes the next step, then pass the card. Show all steps and circle any regrouped digits.

Worked example: 36 x 42 = 1,512. Estimate 40 x 40 = 1,600 [1]. Row one: 2 x 36 = 72. Write 0. Row two: 40 x 36 = 1,440. Add: 72 + 1,440 = 1,512.

Ask: Why must the second row start with 0? (You are multiplying by tens, so zero holds the tens place [3].) · How do you know 56 x 38 = 2,128 is reasonable? (Estimate 60 x 40 = 2,400, so 2,128 is close [1].)

Check understanding: Teams turn in one sheet per station with all steps shown; check placeholder zero and final addition before rotating.

Support: Allow a basic facts chart so students can focus on the steps and place value, not fact recall. **Stretch:** Add a challenge station with 245 x 32 and ask teams to estimate first, then solve exactly.

Use: Slides 9–10

50–60 min **Plenary** 10 min · Whole class

To confirm fluent steps and explain the placeholder zero.

YOU DO

1. Ask Slide 11 question: Why must row two of 36 x 24 start with 0?
2. Do Slide 12 quick quiz for 12 x 13 and estimates.
3. Review the 4 steps and link back to relay errors seen.
4. Collect exit answers on paper.

STUDENTS DO

1. Think, pair, share why row two starts with 0.
2. Answer quiz questions and write estimate and exact for exit ticket.

Say: Think, then tell your partner in one sentence why row two starts with 0. Then we will quiz fast. Fluency means correct steps and a reasonable check.

Ask: Why must row two of 36 x 24 start with 0? (Because we multiply by 20, not 2, so 0 holds the tens place [3].) · In 43 x 25, what is 43 x 20? (860.) · 35 x 27 is about what, using 35 x 30? (1,050 is a good estimate [1].)

Check understanding: Vote on Slide 12 answers; if zero-holder is missed, re-show 36 x 42 rows 72 and 1,440.

Support: Give the place-value checklist and allow pointing to the 4 steps while answering. **Stretch:** Ask students to write a hidden zero-placeholder error for another pair to find.

Use: Slides 11–12

Common mistakes

Mistake	How to spot it	How to fix it
Missing placeholder zero in the second row	Second row is lined up under ones and product is too small	Write 0 first in row two, then multiply by tens, because it is 20 x 36 not 2 x 36 [3]
Forgotten regroup to the next place	Row product is off by 10 or 100 and no small carry is written	Write the carry above the next digit and add it after multiplying
Misaligned digits and wrong final addition	Rows are crooked and ones, tens, hundreds are added in wrong columns	Line up digits neatly by place on grid paper and add column by column

Support

- Allow a basic facts chart so students can focus on the steps and place value, not fact recall
- Provide a place-value checklist: multiply ones, regroup, multiply tens with zero placeholder, add rows
- Provide pre-drawn grids for lining up digits neatly

Stretch

- Add a challenge station with 245 x 32 and ask teams to estimate first, then solve exactly
- Try 1,324 x 6 and explain where the extra thousand goes when regrouping
- Write a tricky example with a hidden zero-placeholder error for another pair to find

For the LSE or teaching assistant

Stay with relay teams that miss regrouping or the zero; prompt checklist, check carries, and confirm estimate is close.

Safety

- Keep aisles clear and backpacks under desks, walk between stations, no running or pushing.

Check for understanding

Question	Answer
Solve 12 x 13 = ?	156
35 x 27 is about? Use 35 x 30.	1,050 is a good estimate
Why start row two with 0 in 36 x 24?	You are multiplying by tens, so 0 holds the tens place

Homework

Solve 27 x 34 and 132 x 25 with the standard algorithm; estimate first to check.

Sources

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