



# Cumberland County Schools

## Objective 1.02a – Multiplying Two-Digit by Two-Digit Numbers

**Lesson Title:** Multiplying Two-Digit by Two-Digit Numbers  
**Curriculum Area:** Mathematics  
**Grade:** Fourth  
**Time:** 90 minutes

### I. PLAN

**A. NCSCS Goal 1:**

The learner will read, write, model, and compute with non-negative rational numbers.

**B. NCSCS Objective 1.02a:**

Multiply two-digit by two-digit numbers (larger numbers with calculator).

**C. CCS Task Analysis:**

**TLW:** Multiply one- to three-digit numbers by two-digit multiples of 10.

**TLW:** Develop strategies for multiplying and dividing numbers.

**D. CCS Pacing Guide:**

Quarter: Second

Week(s): 4-9

**E. Lesson Background:**

Strand: Number and Operations

Marzano Level: Applying

**F. Materials:**

- 30 zip-lock baggies with 14 unifix cubes in each
- Math journal – if journals are not used, notebook paper for recording information
- 1 set of vocabulary cards (Attachment A) for each student pair
- 1 set per student of a blue and red pen or colored pencils
- Number cards (Attachment B)
- TI-15 calculators (1 per student)
- Word problems (Attachment C)
- 2 dice per student pair
- Base ten blocks for small group use

**G. Prerequisite Skills:**

- Fluency with multiplication from  $1 \times 1$  to  $12 \times 12$
- Knowledge of multiplication through use of manipulatives (specifically base ten blocks)
- Strategies for multiplying numbers
- Place value (ones, tens)

**H. Essential Question(s):**

- How can applying previously learned multiplication facts aid in solving multiplication problems with two-digit numbers?
- How does the use of multiplication make counting large, same-size number groups more efficient?

## II. IMPLEMENT

### A. Anticipatory Set:

The teacher shows the students 30 zip-lock baggies, which contain 14 cubes. In exaggerated fashion, the teacher tries to count the cubes (skip counting by 14). “Wow! This is hard to count. I am having a lot of trouble. Do you know that there is a much easier way to count items when they are in equal groups? We can multiply the numbers. I have 30 bags with 14 in each bag; therefore, I have 30 groups of 14. I can show this problem using a number sentence:  $30 \times 14$ . The  $x$  in the number sentence means **groups of**. Multiplying is much more efficient than adding, and today we are going to learn how to multiply when we have a two-digit by two-digit number like I have here:  $30 \times 14$ .”

### B. Teacher Input:

“First, let’s review the vocabulary we need to know before we begin to multiply.” The teacher will write the vocabulary words listed below on the board or overhead for the students to copy into their math journals. As the teacher writes, she/he orally reads the words aloud to the students. The students are writing the terms and definitions at the same time as the teacher is writing. (Adding these terms to a word wall would further enhance the learning.)

- **multiplying** – a shortcut for adding same-size groups
- **factors** – two numbers being multiplied
- **product** – the answer in multiplication

### Rehearsal: (Attachment A)

Give each student pair a set of vocabulary cards (Attachment A). Have the students pair off as Student A and Student B. Student A will match each term with the definition first. If Student A is correct, Student B will celebrate the correct answer. If needed, Student B coaches and then celebrates. The roles are then switched. The students shuffle the cards and Student B matches the terms with the correct definition. Student A celebrates. If necessary, Student A coaches and then celebrates.

### Teacher Input:

“Earlier I tried to count 30 baggies which each contained 14 cubes. It was difficult to count the cubes, so I will use multiplication to make that problem much easier to solve. Today we are going to learn how to multiply two-digit numbers. Last year in third grade you multiplied one-digit numbers like  $3 \times 4$  and  $6 \times 7$ . Now we are going to learn to multiply numbers like  $30 \times 14$ .” The teacher then writes  $30 \times 14$  vertically on the overhead or board. “The first thing we want to do is separate the tens and ones places.” The teacher will then draw a line between the ones place and the tens place. Next, the teacher labels each place value position (see example below).

$$\begin{array}{r|l} \text{tens} & \text{ones} \\ 30 & \\ \times 14 & \\ \hline \end{array}$$

### Rehearsal:

The students will continue working in pairs. Student A will write the multiplication problem in his/her math journal. While writing, Student A will explain the problem to Student B (i.e., “This multiplication problem is  $30 \times 14$ , which means 30 groups of 14. I have written this multiplication problem vertically and I have drawn a line to separate the ones place from the tens place. Lastly, I will label each position by writing tens and ones above the correct column.” Student B will coach Student A throughout the process as needed. Then Student B will celebrate with Student A. Next, Student B will write the multiplication problem in his/her journal, label the columns, and explain as he/she is working. Student A coaches as needed and then celebrates with Student B.

**Teacher Input:**

“Now we have set up our multiplication problem and we are ready to begin solving. You start by multiplying the value of each digit in one factor by the value of each digit in the other factor. List all the partial products and finally add.” While making the previous statement to the students, be sure to point to each part of the problem to which you are referring. “Let’s begin by multiplying by the numbers in the ones column.”

tens	ones
3	0
X 1	4
	0
	120

Multiply by the **ones**.

$4 \times 0 = 0$

$4 \times 30 = 120$

Walk the students through each step of the process. Start with multiplying by ones (using the colors to emphasize the ones and tens places will make the concept clearer for visual learners). “First, start with the ones place. Take the 4 and multiply it by the 0. Next, multiply the 4 by 30.” Be sure to emphasize that you are multiplying 4 by 30 because the 3 is in the tens place, thus making 30. (This is important due to the fact that a common misconception held by students is that the problem would be  $3 \times 4$ .) As you multiply in the ones place, be sure to write the partial products under the equal symbol to be added later.

**Rehearsal:**

The students will work in pairs and continue where they left off in their math journal. Student A will multiply the numbers in the ones place. While writing, Student A will explain this step of the problem to Student B (i.e., “First I will multiply  $4 \times 0$ , which equals 0. The zero will go under the equal symbol beneath the ones column. Next, I will multiply  $4 \times 30$ , which equals 120. 120 will go beneath the zero, lining up properly with the tens column.” Student B will coach Student A throughout the process as needed. Then Student B will celebrate with Student A. Next, Student B will multiply the numbers in the ones place in his/her journal and explain as he/she is working. Student A coaches as needed and then celebrates with Student B.

**Teacher Input:**

“Next, we will multiply the tens place. Take 10 and multiply it by 0.” (Once again, emphasize that it is a 10 due to the place value position.) “Now multiply  $10 \times 30$ . Continue writing the partial products underneath the multiplication problem. We have multiplied each part of our multiplication problem and we listed the partial products.”

tens	ones
3	0
X 1	4
	0
	120
	0
	300

Multiply by the **tens**.

$10 \times 0 = 0$

$10 \times 30 = 300$

**Rehearsal:**

The students will work in pairs and continue where they left off in their math journal. Student A will multiply the numbers in the tens place. While writing, Student A will explain this step of the problem to Student B (i.e., “First, I will multiply  $10 \times 0$ , which equals 0. The zero will go under the equal symbol beneath the ones column. Next, I will multiply  $10 \times 30$ , which equals 300. 300 will go beneath the zero, lining up properly with the tens column.”) Student B will coach Student A throughout the process as needed. Then Student B will celebrate with Student A. Next, Student B will write “multiply the numbers in the tens column” in his/her journal and explain as he/she is working. Student A coaches as needed and then celebrates with Student B.

**Teacher Input:**

“Next, we will add the partial products and then we will have the product of  $30 \times 14$ .” Add the numbers aloud so that the students continue to hear the process. “We have solved our multiplication problem:  $30 \times 14 = 420$ .”

tens	ones
3	0
X 1	4
	0
	120
	0
+ 3	300
420	

Add the partial products.  
 $0 + 120 + 0 + 300 = 420$

**Rehearsal:**

The students will work in pairs and continue where they left off in their math journal. Student A will add the partial products. While writing, Student A will explain this step of the problem to Student B (i.e., “The last step to solving this two-digit multiplication problem will be to add the partial products.  $0 + 120 + 0 + 300 = 420$ . The product of the multiplication problem  $30 \times 14$  is 420.”) Student B will coach Student A throughout the process as needed. Then Student B will celebrate with Student A. Next, Student B will add the partial products, record the answer to  $30 \times 14$  in his/her journal, and explain as he/she is working. Student A coaches as needed and then celebrates with Student B.

**Teacher Input:**

“We have gone through each of the steps to solving a two-digit multiplication problem. I am going to walk you through the steps one more time before I give you each a chance to try problems on your own. The next problem we will do is  $40 \times 27$ .” The teacher writes the  $40 \times 27$  vertically on the board. “The first thing we want to do is separate the tens and ones places.” The teacher will then draw a line between the ones and the tens places. Next, the teacher labels each place value position (see example below).

tens	ones
4	0
x 2	7

“Now we have set up our multiplication problem and we are ready to begin solving. To multiply, you start by multiplying the value of each digit in one factor by the value of each digit in the other factor. List all the partial products and finally add.” While making the previous statement to the students, be sure to point to each part of the problem to which you are referring. “Let’s begin by multiplying the ones.”

tens	ones
4	0
x 2	7
	0
	280
	0
+	800
	1080

Multiply by the **ones**.

$7 \times 0 = 0$

$7 \times 40 = 280$

Multiply by the **tens**.

$20 \times 0 = 0$

$20 \times 40 = 800$

Add the partial products.

$0 + 280 + 0 + 800 = 1080$

Walk the students through each step of the process. Start with multiplying by ones (continue to use the colors to emphasize the ones and tens places). “First, start with the ones place. Take the 7 and multiply it by the 0. Next, multiply the 7 by 40.” Be sure to emphasize that you are multiplying 7 by 40 because the 4 is in the tens places, therefore having a value of 40. As you multiply the numbers in the ones place, be sure to write the partial products under the equal symbol to be added later.

“Next, we will multiply the tens place. Take 20 and multiply it by 0. Now multiply  $20 \times 40$ . Continue writing the partial products underneath the multiplication problem. Finally, we will add the partial products and then we will have the product of  $40 \times 27$ .” Add the numbers aloud so that the students continue to hear the process. “We have now solved our two-digit by two-digit multiplication problem:  $40 \times 27 = 1080$ .”

### Rehearsal: RallyCoach

\*The teacher reminds the students to follow each step of the process:

- Write the problem.
- Separate the ones and tens place.
- Multiply the ones place first (all answers from the ones place will be in blue).
- Multiply the tens place next (all answers from the tens place will be in red).
- Add all of the partial products to find the final product.

- The teacher writes the following problem on the board:  $40 \times 21$ .
- Student B will begin the process by multiplying  $40 \times 21$ . Student B must verbally explain the steps as he/she works through the problem.
- Student A will confirm and/or coach and celebrates B's process of multiplying.

After allowing student pairs to complete the problem, the teacher leads the students through the process to solve the problem as a class.

Teacher – "If you are a student A, tell me what to do first." (draw a line separating the tens and ones)

Teacher – "All B's, tell me what step is next." (multiply  $1 \times 0$  and  $1 \times 40$ ).

Teacher – "B's, tell me what to do next." (multiply  $20 \times 0$  and  $20 \times 40$ )

Teacher – "A's, tell me the final step to solving this problem."

(add the partial products  $0 + 40 + 0 + 800$ )

The teacher writes the following problem on the board:  $30 \times 15$ . Student A will then multiply  $30 \times 15$ . Student A must verbally explain the steps as he/she works through the problem. Student B will confirm and/or coach and celebrate A's process of multiplying.

After allowing student pairs to complete the problem, the teacher leads the students through the process to solve the problem as a class.

Teacher – "If you are a student B, tell me what to do first." (draw a line separating the tens and ones)

Teacher – "All A's, tell me what step is next." (multiply  $5 \times 0$  and  $5 \times 30$ ).

Teacher – "A's, tell me to do next." (multiply  $10 \times 0$  and  $10 \times 30$ )

Teacher – "B's, tell me the final step to solving this problem."

(add the partial products  $0 + 150 + 0 + 300$ )

**C. Guided Practice: Mix-Pair-Share (Attachment B)**

Students will mix around the room (with math journal, TI-15, and red and blue pens), greeting each other by saying, "The answer in multiplication is the product." Students mix until the teacher says, "Pair." The students must pair according to their number card. One student must have a card, which is a multiple of ten. The new partner must have a card with the multiplication symbol and a number (i.e.,  $\times 34$ ). Once the students pair, they decide who is A and who is B (i.e., whose first name comes first in the alphabet); then they solve their problem.

\*Both students should write the problem, steps, and solution in their math journal.

Partner A will begin the process by dividing the problem into ones and tens. Partner A will also solve the ones portion of the multiplication problem. Partner B will confirm and/or coach and celebrate A's process. Partner B will solve the tens portion of the multiplication problem and add the partial products to find the final product. Partner A will confirm and/or coach and celebrate B's process.

\*Both students check the multiplication using the calculator.

**D. Closure: Math Journal Entry**

The teacher gives two 2-digit problems (i.e.,  $60 \times 17$  and  $50 \times 32$ ) for students to solve in their math journals. Allow students time to complete the problems, then as a whole group, check the problems. The teacher reviews the process by writing the problems and steps for solving each on the board or overhead.

**E. Independent Practice: Differentiated Assignment**

**Advanced Learners:**

Students will each create five word problems. The five word problems must be able to be solved by using multiplication, and the numbers within the problems must be 2-digit numbers. After writing the word problems the students will trade with each other and solve a word problem written by a classmate. The word problem and a solution (consisting of an answer followed by the unit, a number sentence, and a paragraph explaining the strategy used to solve the problem) will be recorded in a math journal. Students should have access to a TI-15 calculator to check work.

**Proficient Learners: (Attachment C)**

Students will work with a partner to solve a multiplication word problem selected from a given set of word problems (Attachment C). The two word problems and solutions (consisting of an answer followed by the unit, a number sentence, and a paragraph explaining the strategy used to solve the problem) will be recorded in a math journal. Students should have access to a TI-15 calculator to check work.

**Strategic Learners:**

Each student pair will have two dice. The students will roll the two dice to create a number (i.e., student rolls a 2 and 3 – the number can be 23 or 32). The number rolled will be multiplied by 10. Students should have access to a TI-15 calculator to check work.

- Student A rolls the dice.
- Student B solves the problem in his/her math journal.
- Student A confirms answer and/or coaches as needed and then celebrates.
- Student B rolls the dice.
- Student A solves the problem in his/her math journal.
- Student B confirms the answer and/or coaches as needed and then celebrates.
- Process continues until teacher calls time.

**Intensive Learners:**

Students will work in a small group with teacher to solve two-digit multiplication problems using base ten blocks. As the students model the multiplication problems using the manipulatives, they will also work through the process taught in this lesson, which will allow students to connect the manipulative to the algorithm.

**III. ASSESS:**

- A. **Products:**
- B. **Diagnostic (see background):**
- C. **Pre-Assessment:**
- D. **Post Assessment (EOG format plus 2 open-ended)**

**IV: RESOURCES:**

- A. **Websites:**  
<http://www.mhschool.com/math/2003/student/level2.php?isbn=0021040052&level1=6>
- B. **Materials:**
- C. **Professional Development Opportunities:**

# Vocabulary Cards

**multiply**

a shortcut for  
adding same-  
size groups

**factor**

two numbers  
being  
multiplied

**product**

the answer in  
multiplication

# Number Cards

10	x 56
20	x 62
30	x 24
40	x 16
50	x 37
10	x 41
20	x 8
30	x 53
40	x 61
50	x 29
10	x 35
20	x 45
30	x 19
40	x 20

# Word Problems

Maria wants to buy 13 tickets for the amusement rides at the fair. Each ticket costs 60¢. How much money does she need?

Kim bought 20 packs of gum. There are 15 pieces of gum in each pack. How many pieces of gum does Kim have?

Megan has 15 bags of cookies for her party. Each bag contains 40 cookies. How many cookies does Megan have?

Don has 160 flowers. He puts 2 flowers in each vase. How many vases can he fill?

Mom bought 20 boxes of donuts. Each box contains a dozen donuts. How many donuts did mom buy in all?

Chad had 10 boxes of crayons. Each box held 24 crayons. How many crayons did Chad have?

Twenty-six children are playing tennis together. They each brought 10 tennis balls. How many tennis balls do they have total?

There are 40 boxes. Each box contains 18 rocks. How many rocks are there in all?