

Student Guide

Multiplication Strategies (SG pp. 167–170)

Questions 1–19

- 1.* Answers may vary.
- 2.* Answers may vary. We do not have to agree on a method. We may each see a problem in a different way. The important thing is to arrive at the correct answer.
- 3.* With each strategy, we break the number into parts, multiply each part, and add the products to arrive at the total product.

4.

	20	7	
7	$7 \times 20 = 140$	$7 \times 7 = 49$	$\begin{array}{r} 140 \\ + 49 \\ \hline 189 \end{array}$

$\begin{array}{r} 27 \\ \times 7 \\ \hline \end{array} = \begin{array}{r} 20 + 7 \\ \hline 7 \end{array}$
 $140 + 49 = 189$

5.

	30	8	
8	$8 \times 30 = 240$	$8 \times 8 = 64$	$\begin{array}{r} 240 \\ + 64 \\ \hline 304 \end{array}$

$\begin{array}{r} 38 \\ \times 8 \\ \hline \end{array} = \begin{array}{r} 30 + 8 \\ \hline 8 \end{array}$
 $240 + 64 = 304$

6.

	70	6	
3	$3 \times 70 = 210$	$3 \times 6 = 18$	$\begin{array}{r} 210 \\ + 18 \\ \hline 228 \end{array}$

$\begin{array}{r} 76 \\ \times 3 \\ \hline \end{array} = \begin{array}{r} 70 + 6 \\ \hline 3 \end{array}$
 $210 + 18 = 228$

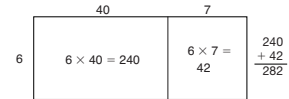


1. Make a table like the one Nick and his friends made. Sort the problems.
2. Does everyone have to agree on the same method for each problem? Explain.

Rectangle Model and Expanded Form

Mr. Moreno decided to use some of the multiplication problems his students sorted to review paper-and-pencil multiplication. Mr. Moreno selected 6×47 . He drew a rectangle and filled it in as shown below.

Mr. Moreno broke apart 47 into 40 + 7. He multiplied the 6×40 and got 240. Then he multiplied the 6×7 and got 42. Finally, he added 240 + 42 to get 282.



Here is another way to show the same idea using expanded form:

$$\begin{array}{r} 47 = 40 + 7 \\ \times 6 \quad \times 6 \\ \hline 240 + 42 = 282 \end{array}$$

3. Explain how using rectangles is similar to using expanded form. Identify where each number in each method comes from.

Solve these problems in two ways. First use the rectangle model. Then use the expanded-form method.

4. 27×7
5. 38×8
6. 76×3

Mr. Moreno asked his class, "Can you multiply a three-digit number times a one-digit number using rectangles and the expanded-form method? Try it using 4×237 ."

The class thought for awhile before Maya raised her hand. She said, "I think we can use them. Let me explain with rectangles."

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"I drew my rectangle. I broke apart 237 into 200 + 30 + 7. I multiplied 4 × 200 and got 800. I multiplied 4 × 30 and got 120. Then I multiplied 4 × 7 and got 28.

	200	30	7	
4	4 × 200 = 800	4 × 30 = 120	4 × 7 = 28	800 120 + 28 948

"Next I added together 800 + 120 + 28 and got 948.

"I also found it very easy to use the expanded-form for this problem."

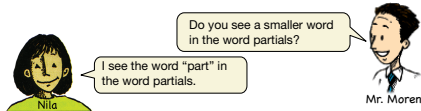
$$\begin{array}{r} 237 = 200 + 30 + 7 \\ \times 4 \qquad \qquad \times 4 \\ \hline 800 + 120 + 28 = 948 \end{array}$$

Solve these problems. Show how to use rectangles and the expanded-form method.

7. 162×8 8. 456×7 9. 875×3

All-Partials Method

Another method is called the **all-partials** method. Mr. Moreno asked his class to look carefully at the word *partials*.



"That's correct," said Mr. Moreno. "We are able to break apart the larger number and find easier products. Then we find the total of the **partial products** for our final answer. Let's take a look at a problem together."

$$\begin{array}{r} 184 \\ \times 7 \\ \hline 700 \quad (7 \times 100) \\ 560 \quad (7 \times 80) \\ 28 \quad (7 \times 4) \\ \hline 1288 \end{array}$$

Student Guide - Page 168

Ana noticed that Mr. Moreno started by multiplying 7 × the hundreds place, 7 × the tens place, then 7 × the ones place. She wondered if the order mattered. Ana solved the problem this way:

$$\begin{array}{r} 184 \\ \times 7 \\ \hline 28 \quad (7 \times 4) \\ 560 \quad (7 \times 80) \\ 700 \quad (7 \times 100) \\ \hline 1288 \end{array}$$

10. What did Ana discover about the order?

Fill in the missing numbers in the multiplication problems. Make sure you can explain what to multiply to get each partial product.

11. $\begin{array}{r} 162 \\ \times 7 \\ \hline 14 \\ \hline 420 \\ \hline 1134 \end{array}$ 12. $\begin{array}{r} 489 \\ \times 3 \\ \hline 240 \\ \hline 1200 \\ \hline 1467 \end{array}$ 13. $\begin{array}{r} 723 \\ \times 8 \\ \hline 24 \\ \hline 5600 \\ \hline 5784 \end{array}$



Solve the following problems. Be ready to show or tell how to solve each one. Use the **Multidigit Multiplication Strategies Menu** in the Reference section.

Nick's school is preparing for their first football game.

14. Nick is selling tickets to the football game. The visiting team can have tickets for 8 rows of seats with 35 seats in each row. How many visiting team students can attend?
 15. Visiting students will travel by bus to the game. Students can sit 4 across each row. There are 23 rows of seats on the bus. How many students can a bus hold?
 16. One hundred forty-three students have each volunteered to sell 7 cakes to raise money for new marching band uniforms. How many cakes will they sell?

Student Guide - Page 169

7. $\begin{array}{r} 100 \qquad 60 \qquad 2 \\ 8 \times 100 = 800 \quad 8 \times 60 = 480 \quad 8 \times 2 = 16 \\ \hline 800 + 480 + 16 = 1296 \end{array}$

$$\begin{array}{r} 162 \\ \times 8 \\ \hline 800 + 480 + 16 = 1296 \end{array}$$

8. $\begin{array}{r} 400 \qquad 50 \qquad 6 \\ 7 \times 400 = 2800 \quad 7 \times 50 = 350 \quad 7 \times 6 = 42 \\ \hline 2800 + 350 + 42 = 3192 \end{array}$

$$\begin{array}{r} 456 \\ \times 7 \\ \hline 2800 + 350 + 42 = 3192 \end{array}$$

9. $\begin{array}{r} 800 \qquad 70 \qquad 5 \\ 3 \times 800 = 2400 \quad 3 \times 70 = 210 \quad 3 \times 5 = 15 \\ \hline 2400 + 210 + 15 = 2625 \end{array}$

$$\begin{array}{r} 875 \\ \times 3 \\ \hline 2400 + 210 + 15 = 2625 \end{array}$$

10. Ana discovered that it makes no difference if she begins multiplying the partial products from the ones place or from the hundreds place.
 11. 700; 7×100
 12. 27; 3×9
 13. 160; 8×20
 14. 280 students
 15. 92 students
 16. 1001 cakes

17. Strategies will vary.
 A. 448
 B. 508
 C. 4344
 D. 7443
 E. 1420
 F. 1968
18. 2592 noise makers
19. 1296 packages of peanuts

Homework (SG pp. 170–171)
Questions 1–10

1. 1296 pencils
2. 500 scissors
3. 2040 red pens
4. 807 erasers
5. 897 cups
6. \$1488
7. A. 6×2
 6×50
 6×400
 B. 8×800
 8×30
 8×9
 C. 5×4
 5×10
 5×600
8. A. 2340 B. 2632
 C. 4974 D. 441
 E. 1813 F. 1680
 G. 6525 H. 4249

9. Answers will vary. Possible response: For 8H I knew that 600×7 is 4200 plus 49 more is 4249.
10. Answers will vary. Possible response: I used the all-partials method for 8C.

$$\begin{array}{r} 829 \\ \times 6 \\ \hline 54 = 9 \times 6 \\ 120 = 20 \times 6 \\ \hline 4800 = 800 \times 6 \\ 4974 \end{array}$$

Check-In: Questions 17-19

17. Sort the following problems into two groups: Mental math or paper and pencil. Show or tell how you solved them.
- A. 64×7
 - B. 127×4
 - C. 8×543
 - D. 827×9
 - E. 5×284
 - F. 328×6
18. Noise makers will be passed out to home team students to show their school spirit. A box holds 288 noise makers. The school ordered 9 boxes. How many noise makers will the school receive?
19. The food stand ordered 6 boxes of peanuts. Each box holds 216 packages. How many packages of peanuts will be at the food stand?

Homework

Solve the following problems using a variety of strategies. Show all of your work. Use the *Multidigit Multiplication Strategies Menu* in the Reference section.

Bessie Coleman School is setting up a school store. Luis is in charge of ordering supplies.

1. Pencils are packaged in one-gross boxes (one gross = 144 items). Luis ordered 9 boxes. How many pencils will the store have?
2. Scissors come 25 to a box. Four boxes make up one carton. Luis ordered 5 cartons. How many scissors will the store have?
3. Red pens come in boxes of 6 pens each. Luis ordered 340 boxes. How many red pens will the store have?
4. The store has 87 erasers in stock. They ordered 3 more boxes. Each box contains 240 erasers. When the boxes arrive, how many erasers will they have?

Student Guide - Page 170

5. The school colors are red and blue. The store has 189 red cups. They want some blue cups. Cups come in cartons of 236. Luis purchased 3 cartons. How many red and blue cups will the store have altogether?
6. Fifth-grade students at Bessie Coleman School must have geometry kits. Each kit includes a ruler, a protractor, and a compass. The company charges \$8.00 for each kit. Luis purchased 186 kits. How much money does he owe the company?
7. Below are three problems solved using the all-partials method. Rewrite each problem and write a multiplication sentence that shows where each partial product comes from. The first one is started as an example.

<p>A. 452 $\times 6$ $\hline 12 = 6 \times 2$ 300 2400 $\hline 2712$</p>	<p>B. 839 $\times 8$ $\hline 6400$ 240 72 $\hline 6712$</p>	<p>C. 614 $\times 5$ $\hline 20$ 50 3000 $\hline 3070$</p>
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8. Solve using any method.

A. 468×5	B. 329×8
C. 829×6	D. 147×3
E. 259×7	F. 420×4
G. 725×9	H. 607×7
9. For which problem(s) in Question 8 did you use a mental math strategy? Select one and explain your thinking.
10. For which problem(s) in Question 8 did you use a pencil-and-paper strategy? Select one problem and show or tell what you did.

Student Guide - Page 171