

Student Guide

Multiplication Strategies for Larger Numbers

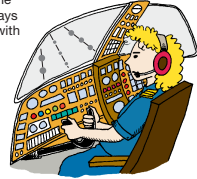
Questions 1–30 (SG pp. 284–289)

1. Answers will vary. Possible response: 324 is almost like \$3.25.  $4 \times \$3.00 = \$12.00$  and 4 quarters adds another dollar, so it's about \$13.00, so  $324 \times 4$  is almost 1300.
2. 1296 lights; methods and explanations will vary.
3.  $4 \times 20 = 80$ ; or  $4 \times 2$  tens = 8 tens
4. The 8 skinnies model 80, or 8 tens
5.  $4 \times 300 = 1200$ ;  $4 \times 3$  hundreds = 12 hundreds, or 1200
6. The 12 flats model 1200, or 12 hundreds
7. Shannon also found partial products by partitioning 324 into  $300 + 20 + 4$ , multiplied each of the parts by 4, and added them.
8. John and Shannon both partitioned 324 into hundreds, tens, and ones; multiplied each separately by 4; then added the partial products. Shannon showed her partitions using the area model.
9. The flats model  $4 \times 300 = 1200$ , the skinnies model  $4 \times 20 = 80$ , and the bits model  $4 \times 4 = 16$ .
10. **A.**  $300 \times 3 = 900$   
**B.** Yes, Grace's answer is reasonable.  $3 \times 300$  is 900, so the answer should be a little more than 900.  
**C.\*** Grace knew that  $3 \times 0$  tens equals 0; she could have included this partial product (0) into her calculations, but she knew it wasn't necessary. Adding 0 does not change an answer.  
**D.** Possible response: Yes;  
 $3 \times 300 = 900$   
 $3 \times 6 = 18$   
 $900 + 18 = 918$

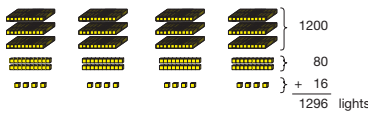
Copyright © Kendall Hunt Publishing Company

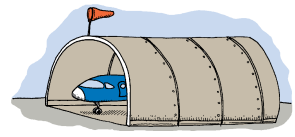
### Multiplication Strategies for Larger Numbers

1. Pilot Jones flies in and out of Busy Bee Airport. This airport has four runways. Workers are putting new lights along the runways. Each runway needs 324 lights. Estimate about how many lights will be needed for all the runways at Busy Bee Airport.
2. Use any method you wish to calculate the exact number of lights for the four runways at Busy Bee Airport. Explain your work with numbers, words, pictures, or base-ten shorthand.



**Connect Methods and Strategies**  
 Irma found the total number of lights by modeling  $4 \times 324$  using base-ten pieces. When she added her pieces, she wrote the problem on the right.




$$\begin{array}{r}
 1200 \\
 + 80 \\
 + 16 \\
 \hline
 1296 \text{ lights}
 \end{array}$$


284 SG • Grade 4 • Unit 7 • Lesson 7 Multiplication Strategies for Larger Numbers

Student Guide - Page 284


Roberto solved the problem using the all-partials method of multiplication.



$$\begin{array}{r}
 324 \\
 \times 4 \\
 \hline
 1200 \\
 80 \\
 + 16 \\
 \hline
 1296 \text{ lights}
 \end{array}$$

3. Explain where the partial product 80 came from.
4. Which of Irma's base-ten pieces model 80?
5. Explain where the partial product 1200 came from.
6. Which of Irma's base-ten pieces model 1200?

Shannon used rectangles to solve the problem.




	300	20	4	
4	$4 \times 300 = 1200$	$4 \times 20 = 80$	$4 \times 4 = 16$	

$$\begin{array}{r}
 1200 \\
 + 80 \\
 + 16 \\
 \hline
 1296 \text{ lights}
 \end{array}$$

7. How is Shannon's method similar to Roberto's?

John used expanded form to solve the airport lights problem.



$$\begin{array}{r}
 324 = 300 + 20 + 4 \\
 \times 4 \qquad \times 4 \\
 \hline
 1200 + 80 + 16 = 1296 \text{ lights}
 \end{array}$$

8. How is John's method similar to Shannon's?
9. How do Irma's base-ten pieces model the parts of John's method?
10. Grace computed  $3 \times 306$  like this:
 
$$\begin{array}{r}
 306 \\
 \times 3 \\
 \hline
 918
 \end{array}$$
  - A. Estimate an answer to Grace's problem.
  - B. Is Grace's answer reasonable? Why or why not?
  - C. Why are there only two partial products in this problem?
  - D. Can you solve this problem using mental math? Explain.

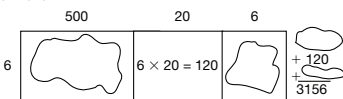
Multiplication Strategies for Larger Numbers SG • Grade 4 • Unit 7 • Lesson 7 285

Student Guide - Page 285

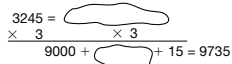
\*Answers and/or discussion are included in the lesson.

11. Ming solved some multiplication problems, but then he spilled jelly on his paper. When he wiped it off, parts of his work were missing. Help Ming. Rewrite the problems and fill in the missing parts.

A.  $6 \times 526$



B.  $3245 \times 3$



C.  $8 \times 263$



**Practice Multiplication Methods**

Solve the following problems using the all-partials method.

12.  $\begin{array}{r} 132 \\ \times 3 \\ \hline \end{array}$

13.  $\begin{array}{r} 3624 \\ \times 2 \\ \hline \end{array}$

14.  $\begin{array}{r} 1904 \\ \times 4 \\ \hline \end{array}$

Solve the following problems using rectangles.

15.  $\begin{array}{r} 728 \\ \times 6 \\ \hline \end{array}$

16.  $\begin{array}{r} 1709 \\ \times 3 \\ \hline \end{array}$

17.  $\begin{array}{r} 235 \\ \times 4 \\ \hline \end{array}$

Solve the following problems using expanded form.

18.  $\begin{array}{r} 216 \\ \times 5 \\ \hline \end{array}$

19.  $\begin{array}{r} 543 \\ \times 3 \\ \hline \end{array}$

20.  $\begin{array}{r} 2727 \\ \times 2 \\ \hline \end{array}$

Copyright © Kendall Hunt Publishing Company

15. 

700	20	8
$6 \times 700 =$ 4200	$6 \times 20 =$ 120	$6 \times 8 =$ 48

 $\begin{array}{r} 4200 \\ 120 \\ + 48 \\ \hline 4368 \end{array}$

16. 

1000	700	9
$3 \times 1000 =$ 3000	$3 \times 700 =$ 2100	$3 \times 9 =$ 27

 $\begin{array}{r} 3000 \\ 2100 \\ + 27 \\ \hline 5127 \end{array}$

17. 

200	30	5
$4 \times 200 =$ 800	$4 \times 30 =$ 120	$4 \times 5 =$ 20

 $\begin{array}{r} 800 \\ 120 \\ + 20 \\ \hline 940 \end{array}$

18.  $\begin{array}{r} 216 = 200 + 10 + 6 \\ \times 5 \qquad \qquad \qquad \times 5 \\ \hline 1000 + 50 + 30 = 1080 \end{array}$

19.  $\begin{array}{r} 543 = 500 + 40 + 3 \\ \times 3 \qquad \qquad \qquad \times 3 \\ \hline 1500 + 120 + 9 = 1629 \end{array}$

20.  $\begin{array}{r} 2727 = 2000 + 700 + 20 + 7 \\ \times 2 \qquad \qquad \qquad \times 2 \\ \hline 4000 + 1400 + 40 + 14 = 5454 \end{array}$

**Student Guide - Page 286**

11. A. 

500	20	6
$6 \times 500 =$ 3000	$6 \times 20 = 120$	$6 \times 6 =$ 36

 $\begin{array}{r} 3000 \\ + 120 \\ + 36 \\ \hline 3156 \end{array}$

B.  $\begin{array}{r} 3245 = 3000 + 200 + 40 + 5 \\ \times 3 \qquad \qquad \qquad \times 3 \\ \hline 9000 + 600 + 120 + 15 = 9735 \end{array}$

C.  $\begin{array}{r} 263 \\ \times 8 \\ \hline 1600 \\ 480 \\ 24 \\ \hline 2104 \end{array}$

12.  $\begin{array}{r} 132 \\ \times 3 \\ \hline 6 \\ 90 \\ \hline 396 \end{array}$

13.  $\begin{array}{r} 3624 \\ \times 2 \\ \hline 6000 \\ 1200 \\ 40 \\ \hline 7248 \end{array}$

14.  $\begin{array}{r} 1904 \\ \times 4 \\ \hline 16 \\ 3600 \\ \hline 7616 \end{array}$

Copyright © Kendall Hunt Publishing Company

21. Answers will vary. The compact and all-partials methods both multiply the ones, tens, and hundreds separately. The compact method does not record all the partial products, but uses little numbers as a reminder of carries.
22. Answers will vary. The compact and expanded form methods both multiply the ones, tens, and hundreds separately. Using expanded form, the top number is partitioned into its hundreds, tens, and ones before multiplying.
23. **A.** The 2 is a reminder to add 2 tens after the 7 tens are multiplied; it means 2 tens and results from multiplying  $6 \times 4 = 24$ .
- B.**  $4 \times 70 = 280$ ; 280 plus the 2 tens that were carried gives 300; there are 0 tens in 300; record the 0 in the tens column.
- C.** The 3 is a reminder to add 3 hundreds after the hundreds are multiplied; it means 3 hundreds.  $4 \times 70 = 280$ ; 280 plus the 2 tens that were carried gives 300.
- D.**  $4 \times 300 = 1200$ ; 1200 plus the 3 hundreds that were carried gives 1500, or 1 thousand plus 5 hundred; record the 5 in the hundreds column.
- E.**  $4 \times 300 = 1200$ ; 1200 plus the 3 hundreds that were carried gives 1500, or 1 thousand plus 5 hundred; record the 1 in the thousands column.
24. Yes. Nicholas's answer is reasonable because 1504 is between 1200 and 1600 and close to 1600.
25. 
$$\begin{array}{r} 1 \\ 412 \\ \times 6 \\ \hline 2472 \end{array}$$
26. 
$$\begin{array}{r} 1 \\ 5307 \\ \times 4 \\ \hline 21,228 \end{array}$$
27. 
$$\begin{array}{r} 5 \ 5 \\ 356 \\ \times 9 \\ \hline 3204 \end{array}$$
28. Possible response:  $5000 \times 4 = 20,000$
29. **A.** Maya put her "carry 2" above the wrong number and skipped the hundreds column. She should have placed the 2 above the 0 in the hundreds column because it was the carry from multiplying  $6 \times 40$  and adding 3 tens. The 2 means 200 because  $6 \times 40 = 240$ , plus 30 makes 270. Then, multiplying the hundreds column yields  $6 \times 0$  hundreds = 0, add 2 hundreds,  $0 + 2$  hundreds = 2 hundreds, which should be recorded in the hundreds place in the answer.
- B.** 12,276

Copyright © Kendall Hunt Publishing Company

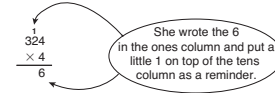
**Compact Method**

Keenya said she could use the compact method to solve the airport lights problem.

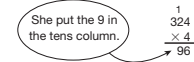


She explained how she solved  $4 \times 324$  this way.

"I began by multiplying  $4 \times 4 = 16$ . I know that 16 is 1 ten and 6 ones."

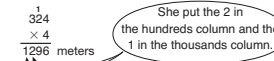


The 1 Keenya wrote above the problem as a reminder is sometimes called a **carry**. Keenya then multiplied  $4 \times 2$  tens = 8 tens, and she then added the extra ten to get 9 tens or 90.



Then Keenya multiplied  $4 \times 3$  hundreds = 12 hundreds or 1200.

She said, "I know that 1200 is 1 thousand and 2 hundreds."



Copyright © Kendall Hunt Publishing Company

21. How is Keenya's compact method similar to Roberto's all-partials method? What is the same and what is different?
22. How is Keenya's compact method similar to John's method using expanded form? What is the same and what is different?

**Student Guide - Page 287**

23. One type of airplane can carry up to 376 passengers. How many people can 4 flights of the airplane carry?

Nicholas did this problem using the compact method.

$$\begin{array}{r} 32 \\ 376 \\ \times 4 \\ \hline 1504 \text{ passengers} \end{array}$$

- A.** Why did Nicholas place a 2 above the tens column? What does this 2 mean?
- B.** How did Nicholas get the 0 in the tens column of the answer?
- C.** Why did Nicholas place a 3 above the hundreds column? What does this 3 mean?
- D.** How did Nicholas get the 5 in the hundreds column of the answer?
- E.** How did Nicholas get the 1 in the thousands column of the answer?
24. Nicholas looked back at his answer and said, " $4 \times 300$  is 1200 and  $4 \times 400$  is 1600. 76 is close to 100, so I know my answer will be more than 1200 and closer to 1600." Is Nicholas's answer reasonable? Why or why not?

Do the following problems using the compact method. Estimate each product to make sure your answer is reasonable.

25. 
$$\begin{array}{r} 412 \\ \times 6 \\ \hline \end{array}$$

26. 
$$\begin{array}{r} 5307 \\ \times 4 \\ \hline \end{array}$$

27. 
$$\begin{array}{r} 356 \\ \times 9 \\ \hline \end{array}$$

28. Explain your estimation strategy for Question 26. Is your answer reasonable? Why or why not?
29. Maya multiplied  $2046 \times 6$  and got 1476. She looked at her answer and said, "That can't be right. My answer is smaller than one of the numbers I was multiplying!" Here is Maya's work.

$$\begin{array}{r} 2 \ 3 \\ 2046 \\ \times 6 \\ \hline 1476 \end{array}$$

- A.** What did Maya do wrong?
- B.** What is the correct answer?

**Student Guide - Page 288**

✓ Check-In: Question 30

30. Your cousin has learned the compact method of multiplication but not any other paper-and-pencil methods. Write a letter to him explaining the expanded form. In your letter, make sure to do the following:
- compare the expanded form to the compact method
  - use examples of problems
  - show what computations are the same and what computations are different

Compare your class collection of multiplication strategies to those on the *Multiplication Strategies Menu for Larger Numbers* in the *Student Activity Book*. Add strategies not represented to the *My Multiplication Strategies Menu*, also in the *Student Activity Book*.



Do the following problems. First make a mental estimate of the answer. Then solve the problem. Compare your estimate with the answer.

1. There are 24 hours in a day. How many hours are there in a week?
2. North-South Airlines has two types of planes. One type of plane can carry 229 passengers and a smaller type can carry 142 passengers. Each plane flies between Minneapolis and Ft. Lauderdale five days each week. How many people can travel every week from Minneapolis to Ft. Lauderdale on North-South Airlines?
3. An airplane has a cruising speed of about 568 miles per hour. About how far can the airplane travel in 3 hours?
4. Another airplane flies at an average speed of 1336 miles per hour. How far can this aircraft travel in 3 hours?
5. A. The Middle City Airport has 478 flights scheduled every day. How many flights are scheduled for an entire week?  
B. Explain your estimation strategy. Is your answer reasonable? Why or why not?



Multiplication Strategies for Larger Numbers SG • Grade 4 • Unit 7 • Lesson 7 289

Copyright © Kendall Hunt Publishing Company

30. Letters will vary. Possible response:

Dear Cousin,  
I will use these examples below to help me compare the compact and expanded form methods.

Compact	Expanded Form
$\begin{array}{r} 2 \\ 34 \\ \times 5 \\ \hline 170 \end{array}$	$\begin{array}{r} 34 = 30 + 4 \\ \times 5 \\ \hline 150 + 20 = 170 \end{array}$

- In both strategies you break apart 34 into tens and ones and multiply.
- In the expanded form you write down each partial product and then add the partial products to find the product.
- In the compact method you carry the tens and add as you go. The little 2 stands for 2 tens you need to add to 150, the product of  $5 \times 30$ .

Student Guide

Homework

Questions 1–23 (SG pp. 289–290)

1. Possible estimate: Think of money—24 is close to 25¢. Seven times 25¢ is \$1.75.  
168 hours;  $7 \times 24 = 168$  hours
2. Possible estimate:  $250 + 150 = 400$ ,  
 $400 \times 5 = 2000$ .  
1855 people;  $229 + 142 = 371$  passengers;  
 $371 \times 5 = 1855$  passengers
3. Possible estimate: About 1650 miles;  
 $3 \times 500 = 1500$   
 $3 \times 50 = +150$   
1650 miles  
 $3 \times 568 = 1674$  miles
4. Possible estimate:  $3 \times 1200 = 3600$ ;  
 $3 \times 1500 = 4500$ ; between 3600 and 4500 miles.  
4008 miles;  $3 \times 1336 = 4008$  miles
5. A. 3346 flights  
B. Possible strategy:  $7 \times 500 = 3500$ ; It is reasonable because 3346 is a little less.

Copyright © Kendall Hunt Publishing Company

# Answer Key • Lesson 7: Multiplication Strategies for Larger Numbers

For Questions 6–20, methods will vary. Students should use each of the methods on the *Multiplication Strategies Menu for Larger Numbers* at least once.

- |            |            |             |
|------------|------------|-------------|
| 6. 270     | 7. 256     | 8. 15,245   |
| 9. 2526    | 10. 9360   | 11. 43,278  |
| 12. 92,040 | 13. 9024   | 14. 255,000 |
| 15. 27,624 | 16. 21,168 | 17. 3800    |
| 18. 9400   | 19. 4700   | 20. 24,800  |
21. Methods will vary.
22. Possible strategy:  $6 \times 400 = 2400$  and  $6 \times 25 = 150$ .  $2400 + 150 = 2550$ . So  $6 \times 421$  is a little less than 2550.
23. Possible strategy:  
 $(3 \times 3000) + (3 \times 8) = 9000 + 24 = 9024$

## Student Activity Book

### Smart Multiplication

#### Questions 1–6 (SAB p. 237)

- $5 \times 600 = 3000$ , so the boys' answer of 355 is way too low. They didn't carry the tens and hundreds; 3085
- $2000 \times 7 = 14,000$  and their answer of 1715 is not close; they partitioned 2045 incorrectly and multiplied  $7 \times 200$  instead of 2000; 14,315.
- $6 \times 700 = 4200$ , so the answer should be at least 4200. They forgot the 7 in 748 means 700 and 4 means 40; 4488.
- $4 \times 400 = 1600$ , but to get the exact answer they should have subtracted 4, because  $4 \times 1 = 4$ ; 1596.
- $3 \times 500 = 1500$ , so 264 is way too low; when they multiplied  $3 \times 500$  they should have gotten 1500; 1614.
- \*  $7 \times 158 = (7 \times 100) + (7 \times 50) + (7 \times 8) = 700 + 350 + 56$ , but they added incorrectly; 1106.

### Practice Problems

Use each of the methods on the *Multiplication Strategies Menu for Larger Numbers* in the *Student Activity Book* at least once. Estimate to be sure your answers are reasonable.

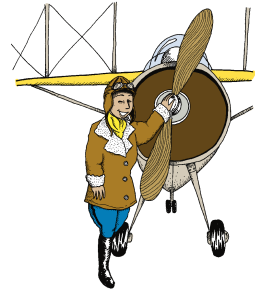
- |                      |                     |                      |
|----------------------|---------------------|----------------------|
| 6. $6 \times 45$     | 7. $8 \times 32$    | 8. $5 \times 3049$   |
| 9. $6 \times 421$    | 10. $30 \times 312$ | 11. $6 \times 7213$  |
| 12. $40 \times 2301$ | 13. $3 \times 3008$ | 14. $60 \times 4250$ |
| 15. $8 \times 3453$  | 16. $7 \times 3024$ | 17. $38 \times 100$  |
| 18. $94 \times 100$  | 19. $100 \times 47$ | 20. $124 \times 200$ |

- Show how to solve Questions 11 and 16 using different methods than the ones you used the first time.
- Explain your estimation strategy for Question 9.
- Explain a mental math strategy for solving Question 13.

### Did You Know?

Mrs. Dewey's classroom, Room 204, is in Bessie Coleman School. Bessie Coleman was the world's first African American female aviator.

When Bessie's brother returned to America after World War I, he told Bessie that French women could fly airplanes. At that time, Bessie worked as a manicurist in a Chicago barber shop. Hearing this news, Bessie decided she too could learn to fly. She went to school in Chicago to learn French. Then she went to France. In 1921 she earned her pilot's license from the Federation Aeronautique Internationale. When she returned to Chicago, she became an air circus performer. A street and a library in Chicago are named after Bessie Coleman.



Copyright © Kendall Hunt Publishing Company

290 5G • Grade 4 • Unit 7 • Lesson 7

Multiplication Strategies for Larger Numbers

## Student Guide - Page 290

Name \_\_\_\_\_ Date \_\_\_\_\_

### Smart Multiplication

Joe and Moe Smart worked on their homework together. They did not estimate to make sure their answers made sense.

Estimate to see if Joe and Moe's answers are reasonable. Check their work and discuss their mistakes with your partner. Then solve each problem correctly using the strategy or method Joe and Moe used for that problem.

$$\begin{array}{r} 617 \\ \times 5 \\ \hline 355 \end{array}$$

$$2. \quad 2045 = 200 + 40 + 5$$

$$\begin{array}{r} \times 7 \\ \hline 1400 + 280 + 35 = 1715 \end{array}$$

$$\begin{array}{r} 3. \quad 748 \\ \times 6 \\ \hline 48 \\ 24 \\ \hline 42 \\ 114 \end{array}$$

$$4. \quad 399 \times 4$$

$4 \times 400 = 1600$ ,  
 minus 1 makes 1599.

$$5. \quad 538 = 500 + 30 + 8$$

$$\begin{array}{r} \times 3 \\ \hline 150 + 90 + 24 = 264 \end{array}$$

$$6. \quad 158$$

$$\begin{array}{r} \times 7 \\ \hline 56 \\ 350 \\ \hline 700 \\ 1016 \end{array}$$

Copyright © Kendall Hunt Publishing Company

Multiplication Strategies for Larger Numbers

SAB • Grade 4 • Unit 7 • Lesson 7 237

## Student Activity Book - Page 237

\*Answers and/or discussion are included in the lesson.