Student Guide

Multiplying by Multiples of Ten (SG pp. 264–269)

Questions 1–18

1.* Answers will vary. Possible response: I skip counted by 20 three times, 20, 40, 60.

2. Strategies will vary.

A. Nila's way: $2 \times 70 = 2 \times 7$ tens
$= 14$ tens
$= 140$

B. Alexis's way: $4 \times 50 = 4 \times 5 \times 10$
$= 20 \times 10$
$= 200$

C. $9 \times 80 = 9 \times 8 \times 10$
$= 72 \times 10$
$= 720$

3. Strategies will vary.

A. $70 \times 2 = 7 \times 2 \times 2$
$= 14 \times 10$
$= 140$

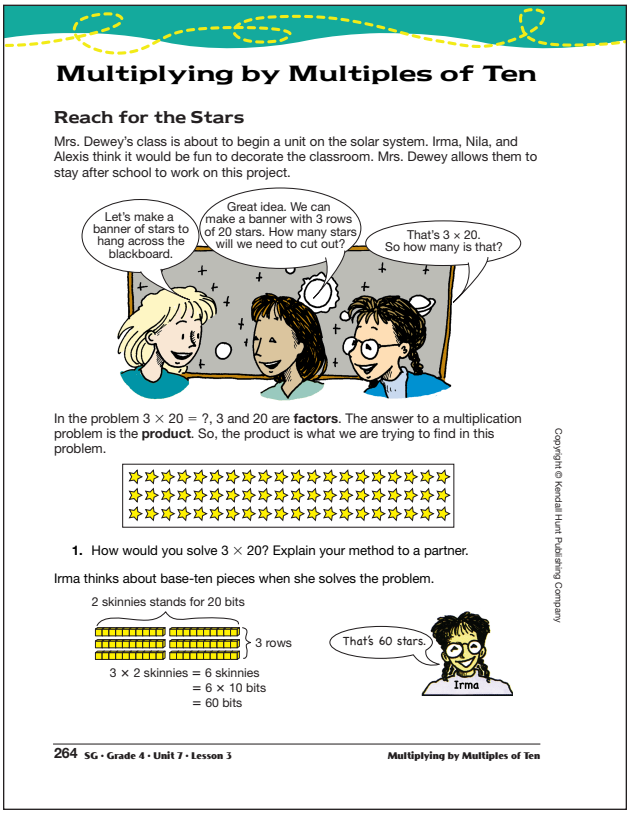
B. $50 \times 4 = 5$ tens $\times 4$
$= 4 \times 5$ tens
$= 20$ tens
$= 200$

C. $80 \times 9 = 8 \times 9 \times 10$
$= 72 \times 10$
$= 720$

D. $60 \times 9 = 6$ tens $\times 9$
$= 9 \times 6$ tens
$= 54$ tens
$= 540$

E. $80 \times 5 = 8 \times 10 \times 5$
$= 8 \times 5 \times 10$
$= 40 \times 10$
$= 400$

F. $20 \times 5 = 2$ tens $\times 5$
$= 10$ tens
$= 100$



Multiplying by Multiples of Ten

Reach for the Stars

Mrs. Dewey's class is about to begin a unit on the solar system. Irma, Nila, and Alexis think it would be fun to decorate the classroom. Mrs. Dewey allows them to stay after school to work on this project.

In the problem 3 × 20 = ?, 3 and 20 are **factors**. The answer to a multiplication problem is the **product**. So, the product is what we are trying to find in this problem.

1. How would you solve 3 × 20? Explain your method to a partner.

Irma thinks about base-ten pieces when she solves the problem.

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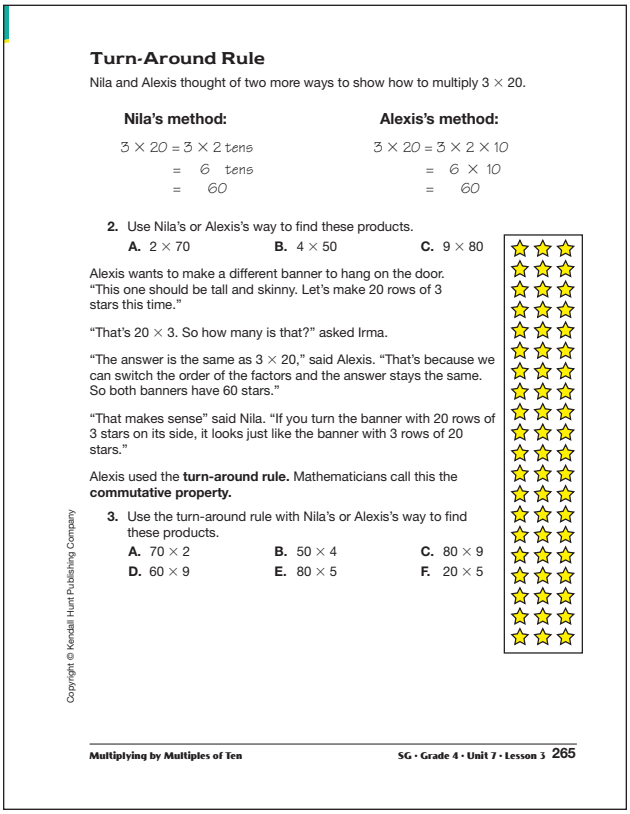

Turn-Around Rule

Nila and Alexis thought of two more ways to show how to multiply 3 × 20.

Nila's method:	Alexis's method:
3 × 20 = 3 × 2 tens	3 × 20 = 3 × 2 × 10
= 6 tens	= 6 × 10
= 60	= 60

2. Use Nila's or Alexis's way to find these products.
A. 2 × 70 **B.** 4 × 50 **C.** 9 × 80

Alexis wants to make a different banner to hang on the door. "This one should be tall and skinny. Let's make 20 rows of 3 stars this time."

"That's 20 × 3. So how many is that?" asked Irma.

"The answer is the same as 3 × 20," said Alexis. "That's because we can switch the order of the factors and the answer stays the same. So both banners have 60 stars."

"That makes sense" said Nila. "If you turn the banner with 20 rows of 3 stars on its side, it looks just like the banner with 3 rows of 20 stars."

Alexis used the **turn-around rule.** Mathematicians call this the **commutative property.**

3. Use the turn-around rule with Nila's or Alexis's way to find these products.
A. 70 × 2 **B.** 50 × 4 **C.** 80 × 9
D. 60 × 9 **E.** 80 × 5 **F.** 20 × 5

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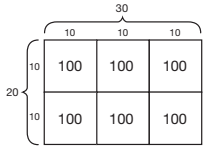
*** Answers and/or discussion are included in the lesson.**

Irma said, "I can draw a rectangle to show the problem, too."

Irma's method with a rectangle



Total tiles = 2 rows × 3 hundreds in each row
= 2 × 300
= 600

4. What is another way to multiply 20 × 30?

Nila and Alexis tried their methods on the same problem.

Nila's method:

20 × 30 = 20 × 3 tens
= 60 tens
= 600

Alexis's method:

20 × 30 = 2 × 10 × 3 × 10
= (2 × 3) × (10 × 10)
= 6 × 100
= 600

5. Explain how Alexis used the turn-around rule. How did she change the order of the factors?

6. Use Irma's rectangle method to multiply 40 × 60. Draw the rectangle.

7. Use Nila's or Alexis's method to multiply 30 × 90. Write the number sentences.

8. Use any method you choose to multiply 70 × 50.

9. Which method is the most efficient: Irma's, Nila's, Alexis's, or a different method? Explain why you think so.

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By the next day, Nila and Irma had finished cutting out all the stars. Nila's dad helped them hang the stars from the ceiling tiles in their classroom after school. Just for fun they decided to calculate the number of ceiling tiles for the whole school building. They estimated that the entire ceiling of the building was about 200 tiles wide and 300 tiles long. They used Nila's method and Alexis's method.

Nila's method:

200 × 300 = 200 × 3 hundreds
= 600 hundreds
= 60,000

Alexis's method:

200 × 300 = 2 × 100 × 3 × 100
= (2 × 3) × (100 × 100)
= 6 × 10,000
= 60,000

10. Find the following sets of products using any method you choose. Look for patterns as you solve the problems. Check your work on a calculator.

A. 80 × 2 = 80 × 20 =

B. 70 × 1 = 70 × 10 =

C. 50 × 8 = 50 × 80 =

D. 90 × 7 = 900 × 70 =

E. 40 × 6 = 400 × 600 =

F. 40 × 5 = 400 × 500 =

11. Irma learned to look for patterns when multiplying numbers that end in zeros. What patterns do you see from the products you found in Question 10?

12. Nila wants to multiply 40 × 40 in her head easily. What method do you think she should use? What is 40 × 40?

13. Nila thought of a rule for multiplication. She said, "To multiply numbers that end in zero, you just multiply the numbers without the zeros on the ends, and then put as many more zeros on the end of the product as there are in the numbers." Do you agree? If so, why do you think the rule works?

14. Alexis says multiplying 60 × 500 is tricky. What is 60 × 500? Why is it tricky?

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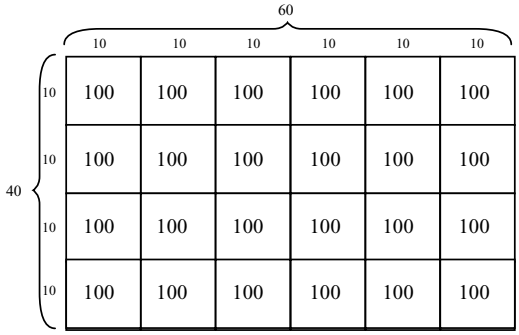
4.* Answers and strategies will vary. See the lesson.

5. Alexis first wrote 20 as 2 × 10 and 30 as 3 × 10. Then she changed the order of the 10 and 3, so she could multiply easier.

6.



Total = 6 hundreds per row × 4 rows
= 600 × 4
= 2400

7. Strategies may vary. Using Nila's method:
30 × 90 = 30 × 9 tens
= 270 tens
= 2700

8. Strategies may vary. Using Alexis's method:
70 × 50 = 7 × 10 × 5 × 10
= (7 × 5) × (10 × 10)
= 35 × 100
= 3500

9.* Responses will vary. See the lesson.

10. **A.** 160; 1600 **B.** 70; 700
C. 400; 4000 **D.** 630; 63,000
E. 240; 240,000 **F.** 200; 200,000

11. Responses will vary. Students may observe that each time a factor is multiplied by ten (which adds a zero to the factor), the product becomes ten times as large (adding a zero to the product).

12. Answers will vary. Students may respond that Nila should multiply 4 × 4 = 16, then add two zeros because each factor of 40 is really 4 × 10. Thus, 40 × 40 = 1600.

13.* Responses will vary. The rule does work. It can be demonstrated using Alexis's method for multiplying by multiples of ten.

14.* 30,000. It is tricky because of the extra zero resulting from 6 × 5 = 30.

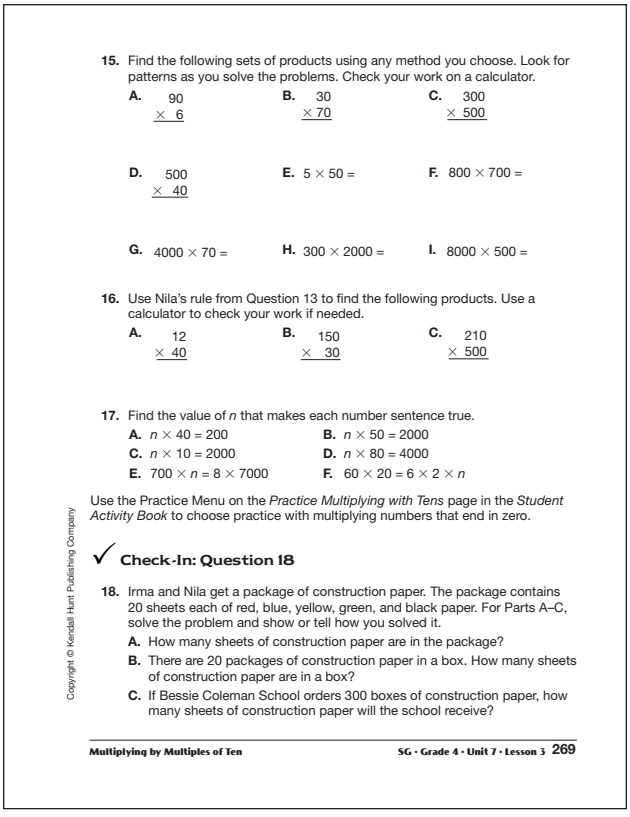
*** Answers and/or discussion are included in the lesson.**

15. A. 540 **B.** 2100
C. 150,000 **D.** 20,000
E. 250 **F.** 560,000
G. 280,000 **H.** 600,000
I. 4,000,000

16. A. 480
B. 4500
C. 105,000

17. A. 5 **B.** 40
C. 200 **D.** 50
E. 80 **F.** 100

18. A. 20 sheets × 5 colors = 100 sheets
B. 100 sheets × 20 packages = 2000 sheets per box
C. 300 boxes × 2000 sheets per box = 600,000 sheets



15. Find the following sets of products using any method you choose. Look for patterns as you solve the problems. Check your work on a calculator.

A. 90 × 6 **B.** 30 × 70 **C.** 300 × 500

D. 500 × 40 **E.** 5 × 50 = **F.** 800 × 700 =

G. 4000 × 70 = **H.** 300 × 2000 = **I.** 8000 × 500 =

16. Use Nila's rule from Question 13 to find the following products. Use a calculator to check your work if needed.

A. 12 × 40 **B.** 150 × 30 **C.** 210 × 500

17. Find the value of *n* that makes each number sentence true.

A. *n* × 40 = 200 **B.** *n* × 50 = 2000
C. *n* × 10 = 2000 **D.** *n* × 80 = 4000
E. 700 × *n* = 8 × 7000 **F.** 60 × 20 = 6 × 2 × *n*

Use the Practice Menu on the *Practice Multiplying with Tens* page in the *Student Activity Book* to choose practice with multiplying numbers that end in zero.

✓ **Check-In: Question 18**

18. Irma and Nila get a package of construction paper. The package contains 20 sheets each of red, blue, yellow, green, and black paper. For Parts A–C, solve the problem and show or tell how you solved it.

A. How many sheets of construction paper are in the package?
B. There are 20 packages of construction paper in a box. How many sheets of construction paper are in a box?
C. If Bessie Coleman School orders 300 boxes of construction paper, how many sheets of construction paper will the school receive?

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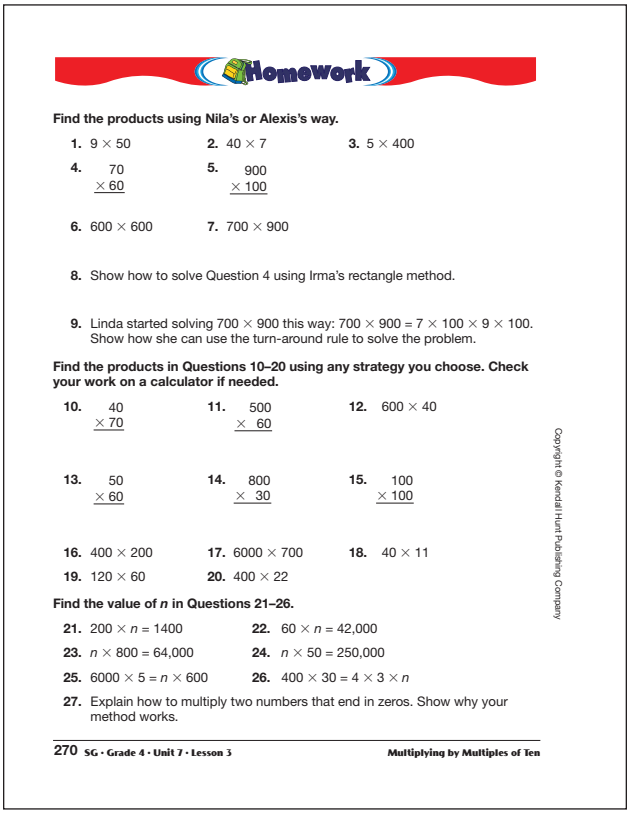

Homework

Find the products using Nila's or Alexis's way.

1. 9 × 50
2. 40 × 7
3. 5 × 400
4. 70 × 60
5. 900 × 100
6. 600 × 600
7. 700 × 900
8. Show how to solve Question 4 using Irma's rectangle method.
9. Linda started solving 700 × 900 this way: 700 × 900 = 7 × 100 × 9 × 100. Show how she can use the turn-around rule to solve the problem.

Find the products in Questions 10–20 using any strategy you choose. Check your work on a calculator if needed.

10. 40 × 70
11. 500 × 60
12. 600 × 40
13. 50 × 60
14. 800 × 30
15. 100 × 100
16. 400 × 200
17. 6000 × 700
18. 40 × 11
19. 120 × 60
20. 400 × 22

Find the value of *n* in Questions 21–26.

21. 200 × *n* = 1400
22. 60 × *n* = 42,000
23. *n* × 800 = 64,000
24. *n* × 50 = 250,000
25. 6000 × 5 = *n* × 600
26. 400 × 30 = 4 × 3 × *n*
27. Explain how to multiply two numbers that end in zeros. Show why your method works.

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Homework

Questions 1–27 (SG p. 270)

1. Nila's way: 9 × 5 tens
   = 45 tens
   = 450
2. Alexis's way: 4 × 10 × 7
   = (4 × 7) × 10
   = 28 × 10
   = 280
3. 2000
4. 4200
5. 90,000
6. 360,000
7. 630,000
8.

70 \ 60	10	10	10	10	10	10
10	100	100	100	100	100	100
10	100	100	100	100	100	100
10	100	100	100	100	100	100
10	100	100	100	100	100	100
10	100	100	100	100	100	100
10	100	100	100	100	100	100
10	100	100	100	100	100	100

   Total = 7 rows × 6 hundreds in each row
   = 7 × 600
   = 4200
9. 700 × 900 = 7 × 100 × 9 × 100
   = 7 × 9 × 100 × 100
   = 63 × 10,000
   = 630,000
10. 2800
11. 30,000
12. 24,000
13. 3000
14. 24,000
15. 10,000
16. 80,000
17. 4,200,000
18. 440
19. 7200
20. 8800
21. 7
22. 700
23. 80
24. 5000
25. 50
26. 1000
27. Explanations will vary.