Student Guide

Break-Apart Products with Larger Numbers

Questions 1–10 (SG pp. 103–105)

1.* Estimations and strategies will vary. Possible response: There are about 150 tiles; 29 is close to 30 and $30 \times 5 = 150$.

2. A. She broke the 29 foot-long side into sections of 20 ft. and 9 ft.

B. The unshaded part has 5 rows and 20 columns. The shaded part has 5 rows and 9 columns.

C. 100 squares in the unshaded part. 45 squares in the shaded part.

D. $100 + 45 = 145$ squares.

E. Responses will vary.

3. A. The 5 represents the number of rows in each of the rectangles.

B. The 20 and 9 represent the number of columns in each part.

C. 5 represents the number of rows in the first rectangle, 20 represents the number of columns. 100 is the number of tiles in the first rectangle.

D. 5 represents the number of rows in the second rectangle and 9 represents the number of columns. 45 is the number of tiles in the second rectangle.

E. They added the number of tiles in each rectangle.

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

4. Responses will vary.

A.

	10	8
4	$4 \times 10 = 40$	$4 \times 8 = 32$

$40 + 32 = 72$

B.

	30	6
5	$5 \times 30 = 150$	$5 \times 6 = 30$

$150 + 30 = 180$

C.

	30	4
6	$30 \times 6 = 180$	$4 \times 6 = 24$

$180 + 24 = 204$

D.

	40	2
5	$5 \times 40 = 200$	$5 \times 2 = 10$

$200 + 10 = 210$

E.

	60	3
8	$8 \times 60 = 480$	$8 \times 3 = 24$

$480 + 24 = 504$

F.

	50	4
9	$50 \times 9 = 450$	$4 \times 9 = 36$

$450 + 36 = 486$

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The student guide page 104 shows:

Linda wanted to solve the problem but she did not have grid paper. So she sketched rectangles to show her work. Here is her sketch for 5×29:

20 ft. | 9 ft.
5 ft. | $5 \times 20 = 100$ | $5 \times 9 = 45$

$5 \times 29 = 100 + 45 = 145$ sq. ft.
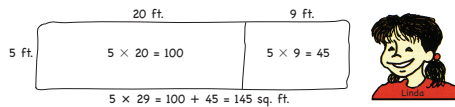
3. Use Ana's and Linda's rectangles to answer the questions below:
  A. What does the 5 represent?
  B. What do the 20 and 9 represent?
  C. What does each number in the sentence 5 x 20 = 100 represent?
  D. What does each number in the number sentence 5 x 9 = 45 represent?
  E. How did they find the total number of squares in the large rectangle?

4. Solve the following problems by breaking the larger number into tens and ones. Sketch rectangles like Linda did to show your work.
  A. 4×18 **B.** 5×36 **C.** 34×6
  D. 5×42 **E.** 8×63 **F.** 54×9

5. Choose a problem in Question 4. Find a way to solve the problem using mental math. Explain your strategy.

Using Expanded Form

6. Shannon and Ming did not use pictures of rectangles to solve 5×29. They solved the problem by writing 29 in expanded form. Here is how they recorded their work:

Shannon's way:
$29 = 20 + 9$
$\times 5 \quad \times 5$
$100 + 45 = 145$

Ming's way:
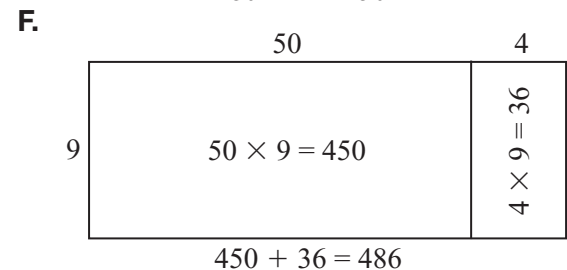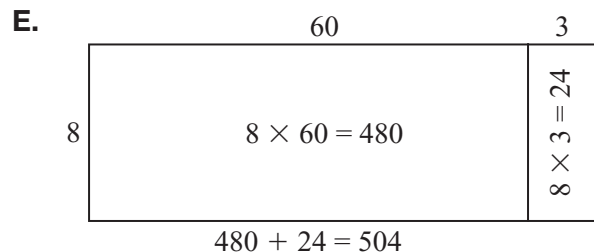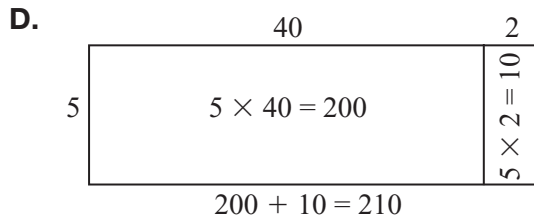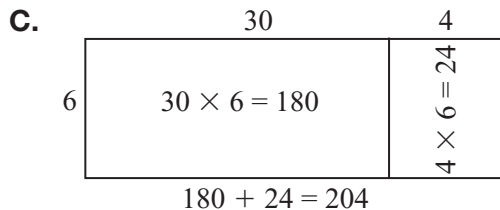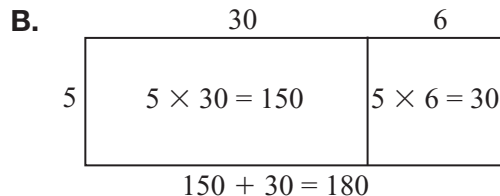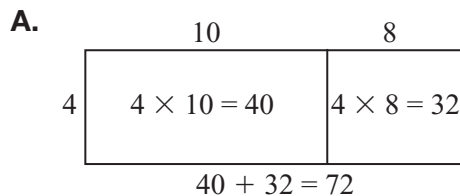$29 = 20 + 9$
$\times 5 \quad \times 5$
100
$+ 45$
145

  A. Discuss with a partner what the numbers in Shannon's and Ming's calculations mean.
  B. Tell how the numbers in Shannon's problem match Ana's rectangle.

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5. Possible response for Question 4A:
$4 \times 20 = 80$, $4 \times 2 = 8$, $80 - 8 = 72$.

6. A.* The 29 is broken into 20 and 9. Both students multiplied 5×20 to get 100 and 5×9 to get 45. Then they added $100 + 45 = 145$.

  B.* Splitting the 29 into 20 and 9 is the same as when Ana broke the 29 ft. length of the rectangle into 20 ft. and 9 ft. pieces. The 5 is the same as the 5 rows of Ana's rectangle.

  100 is the number of squares in the large part of Ana's rectangle. 45 is the number in the small part. 145 is the number in the whole rectangle.

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

7. Shannon's way

$$73 = 70 + 3$$
$$\underline{\times\ 4} \qquad \underline{\quad \times 4}$$
$$280 + 12 = 292$$

Ming's way

$$73 = 70 + 3$$
$$\underline{\times\ 4} \qquad \underline{\quad \times 4}$$
$$280$$
$$\underline{+\ \ 12}$$
$$292$$

8. Methods will vary.

A. 122

B. 188

C. 273

D. 410

E. 176

F. 360

9. Methods will vary.

A. 126

B. 238

10. Possible response for Question 9A:
3 is half of 6; $3 \times 21 = 63$;
$63 + 63 = 126$.

Homework

Questions 1–2 (SG. p. 105)

1. A. 120   **B.** 120   **C.** 240

   D. 240   **E.** 360   **F.** 360

   G. 400   **H.** 400

2. A. 42   **B.** 147   **C.** 112

   D. 365   **E.** 324   **F.** 434

   G. 232   **H.** 297   **I.** 188

3. Possible response for Question 2G:
$8 \times 30 = 240$
$240 - 8 = 232$

7. Solve 73×4 using expanded form. Choose either Shannon's way or Ming's way to record your work.

8. Solve the following problems by breaking the larger number into tens and ones. Record your work using a sketch like Linda or expanded form like Shannon or Ming.

   A. 61×2 **B.** 47×4 **C.** 3×91

   D. 82×5 **E.** 4×44 **F.** 72×5

✓ **Check-In: Questions 9-10**

9. Solve the following problems using rectangles like Linda or expanded form like Shannon or Ming.

   A. 6×21 **B.** 34×7

10. Choose a problem from Question 9 and find a way to break a factor into two parts to solve the problem using mental math. Show or tell your thinking.

Homework

1. Solve the following problems.

   A. 60×2 **B.** 20×6 **C.** 3×80

   D. 8×30 **E.** 40×9 **F.** 90×4

   G. 8×50 **H.** 5×80

2. Solve the following problems by breaking the larger number into tens and ones. Record your work using a sketch of a rectangle like Linda did or expanded form like Shannon or Ming.

   A. 14×3 **B.** 3×49 **C.** 28×4

   D. 73×5 **E.** 6×54 **F.** 62×7

   G. 8×29 **H.** 33×9 **I.** 94×2

3. Choose a problem from Question 2 to solve using mental math. Show or tell your mental math strategy.
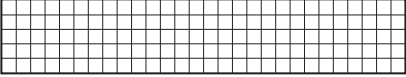
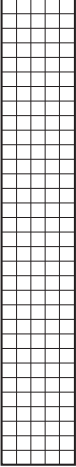**Break–Apart Products with Larger Numbers**   SG · Grade 4 · Unit 3 · Lesson 10 **105**

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Exploring Break-Apart Products with Larger Numbers

1. Find the number of squares in each rectangle. Show or tell how you know.

A.

B.

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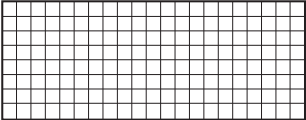
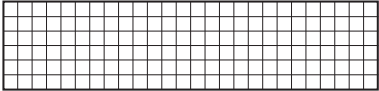*Student Activity Book* - Page 85

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Find the number of small squares in each rectangle below using the break-apart method.

- Break the rectangle into two parts that make the multiplication easier.
- Write number sentences on each part that show the number of squares in each.
- Write a number sentence to show how to find the total number of squares in the large rectangle.
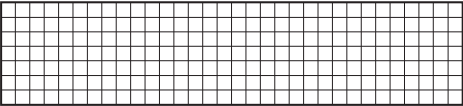
2. 8×21

3. 6×26

4. 7×32

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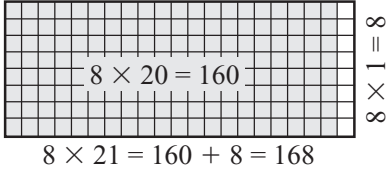
Student Activity Book

Exploring Break-Apart Products with Larger Numbers
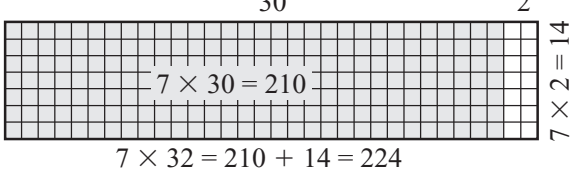
Questions 1–4 (SAB. pp. 85–86)

1. Strategies will vary.

   A.* 140 squares

   B.* 160 squares

Questions 2–4. Strategies will vary. One possible strategy shown.

2.*

$$20 \qquad 1$$
$$8 \quad \boxed{8 \times 20 = 160} \quad 8 \times 1 = 8$$
$$8 \times 21 = 160 + 8 = 168$$

3.

$$20 \qquad 6$$
$$6 \quad \boxed{6 \times 20 = 120} \quad 6 \times 6 = 36$$
$$6 \times 26 = 120 + 36 = 156$$

4.

$$30 \qquad 2$$
$$7 \quad \boxed{7 \times 30 = 210} \quad 7 \times 2 = 14$$
$$7 \times 32 = 210 + 14 = 224$$

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

Student Activity Book

Practicing Break-Apart Products

Homework

Questions 1–4 (SAB. pp. 87–88)

Strategies will vary. Possible response :

1.

$$20 \qquad 7$$

3 | $3 \times 20 = 60$ | $3 \times 7 = 21$ |

$$3 \times 27 = 60 + 21 = 81$$

2.

$$22$$

3 | $3 \times 22 = 66$ |
3 | $3 \times 22 = 66$ |

$$66 + 66 = 132$$

3.

$$6$$

40 | $40 \times 6 = 240$ |

3 | $3 \times 6 = 18$ |

$$240 + 18 = 258$$

4.

$$8$$

30 | $30 \times 8 = 240$ |

7 | $7 \times 8 = 56$ |

$$240 + 56 = 296$$

Name _____ Date _____

Practicing Break-Apart Products

Homework

Find the number of small squares in each rectangle using the break-apart method. The first one is an example.

- Break the rectangle into two parts that make the multiplication easier.
- Write number sentences on each part that show the number of squares in each.
- Write a number sentence to show how to find the total number of squares in the large rectangle.

Example: 4×23

$$20 \qquad\qquad 3$$

4 | $4 \times 20 = 80$ | $4 \times 3 = 12$ |

$$4 \times 23 = 80 + 12 = 92$$

1. 3×27

2. 6×22

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3. 43×6

4. 37×8

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Unit 3 Test

You may use calculators, multiplication tables, or square-inch tiles to solve the following problems.

1. Tom made a rectangle with 16 tiles. If there were 4 rows, how many tiles were in each row? Sketch a picture of this rectangle.

2. List all the factors of 16. Show how you found your answer.

3. Is 16 a multiple of 4? Show or tell how you know.

4. Is 16 a multiple of 5? Show or tell how you know.

5. Is 16 a prime number? Show or tell how you know.

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6. Is 16 a square number? Show or tell how you know.

7. Is 17 a prime number? Tell how you know.

8. Design a box for the TIMS Candy Company that will hold 36 pieces of candy and that has more than two layers. Tell how many layers are in your box. Also, tell how many pieces of candy are in each layer. Each layer must hold the same number of pieces.

9. Use a factor tree to find the prime factors of 60. Write 60 as a product of its prime factors.

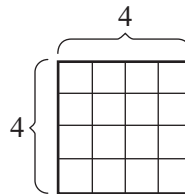**2** TG · Grade 4 · Unit 3 · Lesson 10   **Assessment Master**

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Unit 3 Test

Questions 1–11 (TG pp. 1–4)

1. 4 tiles in each row.

2. 1, 2, 4, 8, 16; 1×16, 2×8, 4×4

3. Yes; $4 \times 4 = 16$

4. No: Strategies will vary. Possible response: Using my calculator, $16 \div 5 = 3.2$, which is not a whole number.

5. No, because it has factors of 2, 4 and 8 in addition to 1 and 16.

6. Yes, because $4 \times 4 = 4^2 = 16$

7. Yes, its only factors are 1 and 17.

8. Responses will vary; Possible box designs are 3 layers of 12 pieces, 4 layers of 9 pieces, 6 layers of 6 pieces, 9 layers of 4 pieces, 12 layers of 3 pieces, 18 layers of two pieces, 36 layers of 1 piece.

9. $2 \times 2 \times 3 \times 5$, or $2^2 \times 3 \times 5$

10. Break-apart strategies will vary. Possible strategy shown:

$40 + 32 = 72$

$4 \times 10 = 40$ $4 \times 8 = 32$
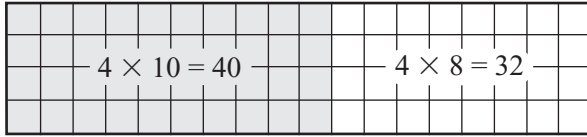
11.* 15; Possible strategy: First I listed all the multiples of 3 that are under 20. That gave me 3, 6, 9, 12, 15, 18. Then I took out all the ones that have a factor of 2. That left me with 3, 9, 15. I then took out 3, which is prime, and 9, which is square. That left me with 15.

Name _____ Date _____

10. Find the number of squares in the rectangle below using the break-apart method.

- Break the rectangle into parts to make it easier to multiply. Write number sentences to show the number of squares in each part.
- Write a number sentence to show how you found the total number of squares in the large rectangle.

Unit 3 Test Feedback Box	Expectation	Check In	Comments
Use arrays to solve multiplication and division problems. [Q# 1, 8, 10]	E1		
Decide if one number is a multiple of another. [Q# 3, 4, 11]	E2		
Find the factors of a number. [Q# 2]	E3		
Decide if a number is prime. [Q# 5, 7, 11]	E4		
Decide if a number is a square number. [Q# 6, 11]	E5		
Find the prime factorization of a number. [Q# 9]	E6		
Use break-apart products to solve multiplication problems with larger numbers. [Q# 10]	E9		

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11. Solve the following number riddle. Write a paragraph about how you found your answer. Use Math Practices Expectation 5 to help organize your thinking.

Date _____

I am a multiple of 3.
2 is not one of my factors.
I am not prime and I am not square.
I am less than 20.
What number am I?

Unit 3 Test Q#11 Feedback Box	Yes . . .	Yes, but . . .	No, but . . .	No . . .
MPE5. Show my work. I show or tell how I arrived at my answer so someone else can understand my thinking.				

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