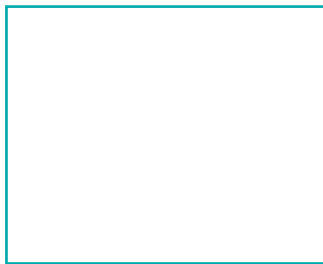


Multiplying Multi-Digit Numbers

NCTM Standards 1, 2, 6, 7, 8, 9, 10

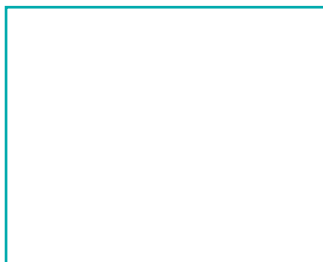
Complete the multiplication sentences. You may split and complete an area model or complete a puzzle.

1 $42 \times 29 = \underline{\hspace{2cm}}$



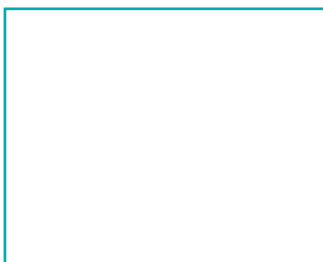
×			42
29			

2 $38 \times 55 = \underline{\hspace{2cm}}$



×			38
55			

3 $76 \times 46 = \underline{\hspace{2cm}}$



×			76
46			

**Make up your own 2-digit by 2-digit multiplication sentences.
Split and complete area models as checks.**

- 4** The product is between 3,000 and 5,000.
Neither factor has a zero in the ones place.

$$\boxed{5} \boxed{2} \times \boxed{} \boxed{} = \boxed{}$$



- 5** The product is between 4,000 and 7,000.
Neither factor has a zero in the ones place.

$$\boxed{} \boxed{} \times \boxed{} \boxed{} = \boxed{}$$

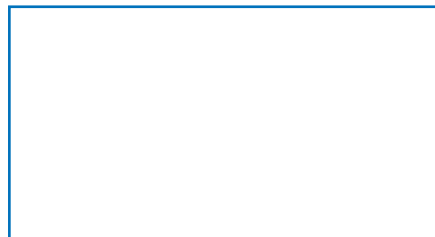


- 6** Tyler's goal is to read between 500 and 750 pages in January. There are 31 days in January. How many pages could he read each day and meet this goal?
Explain how you found your answer.

- 7 Challenge** Make up your own 3-digit by 2-digit multiplication sentence. Split and complete an area model as a check.

The product is between 6,000 and 12,000.
Neither factor has a zero in the ones place.

$$\boxed{} \boxed{} \boxed{} \times \boxed{} \boxed{} = \boxed{}$$



Writing Vertical Records

NCTM Standards 1, 2, 8, 9, 10

Fill in the puzzles.
Then complete the multiplication records.

1

×	40	3	43
20			
8			
28			

$$\begin{array}{r} 40 \\ \times 20 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ \times 20 \\ \hline \end{array}$$

$$\begin{array}{r} 43 \\ \times 28 \\ \hline \end{array}$$

$$\begin{array}{r} 40 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} 43 \\ \times 28 \\ \hline \\ \hline \\ \hline \\ \hline \end{array}$$

2

×	60		68
9			
39			

$$\begin{array}{r} 60 \\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} \square \\ \times 9 \\ \hline 72 \end{array}$$

$$\begin{array}{r} 68 \\ \times 39 \\ \hline \end{array}$$

$$\begin{array}{r} 60 \\ \times \square \\ \hline 1,800 \end{array}$$

$$\begin{array}{r} 8 \\ \times \square \\ \hline 240 \end{array}$$

$$\begin{array}{r} 68 \\ \times 39 \\ \hline \\ \hline \\ \hline \\ \hline \end{array}$$

Write the partial products on the area models.
Then complete the multiplication records.

3

	40	6
20		
8		

$$\begin{array}{r} 46 \\ \times 28 \\ \hline \end{array}$$

4

	50	5
80		
2		

$$\begin{array}{r} 55 \\ \times 82 \\ \hline \end{array}$$

Complete the multiplication records.

5

40
× 30

40
9

7
× 30

7
× 9

39
× 47

6

60
× 40

60
6

4
× 40

4
× 6

46
× 64

7

50
× 70

50
× 2

6
× 70

6
× 2

72
× 56



8 Challenge How can you find this product in an easy way?

$$\begin{array}{r} 12 \\ \times 45 \\ \hline \end{array}$$

Describe your method:

Writing Shorter Records

NCTM Standards 1, 2, 6, 7, 8, 9, 10

Use numbers from the puzzle in the records.

1

×	80	4	84				
20				84	20	→	
5				84		→	
25	2,000	100	2,100	84	25	→	2,100

84	4
×	25

Complete the area models. Then complete the puzzles and records.

2

10		→	×	32	→	32	→	
		→			→		→	
		→			→		→	
		→			→		→	

32	2
×	13

3

		→	×	45	→	45	→	
		→			→		→	
		→			→		→	
		→			→		→	

45	5
×	22

Complete the record. Draw an area model, if you wish.

4

14		→	
14		→	
14	83	→	

$$\begin{array}{r} 14 \\ \times 83 \\ \hline \end{array}$$

Solve the problem.



5 Each of the 28 students in Mrs. Farrell's class baked 2 dozen cookies for a cookie exchange. What is the total number of cookies? Explain how you solved the problem. Show your work.

6 **Challenge** Complete the puzzle and record.

×	100	40	6	146			
30					146	→	
2					146	→	
32					146	→	

$$\begin{array}{r} 146 \\ 32 \\ \hline \end{array}$$

Using Square Number Differences

NCTM Standards 1, 2, 6, 8

Complete the tables.

1

a	2	4				
a^2			100			
$a + 1$				12		
$a - 1$					24	
$(a + 1) \times (a - 1)$						899

2

b	9		15		60		
b^2		64		1,600			
$(b + 1) \times (b - 1)$						143	
$b^2 - 1$							2,499

3 Write an expression equivalent to $(n + 1) \times (n - 1)$.



4 Alex knows that he needs 625 one-foot tiles to cover a floor that is 25 feet by 25 feet. How many one-foot tiles does he need to cover a floor that is 24 feet by 26 feet? Explain how you can use a pattern to solve.

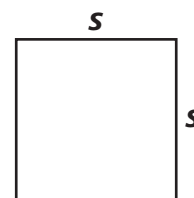
Complete the tables.

5	c	5				
	$c + 3$		10			28
	$c - 3$				11	
	$(c + 3) \times (c - 3)$					2,491
	$c^2 - 9$			91		

6	d					
	$d - 2$		11			
	$d + 2$			9		
	$d^2 - 4$	12			221	8,096
	$(d + 2) \times (d - 2)$					3,596



7 Abby drew this sketch of the square floor she wants to tile. The s stands for the length of each side in feet. She said she can use the expression s^2 to find the number of one-foot tiles she needs. Blake says she should use the expression $s \times s$ to find the number of tiles she needs. Who is correct? Explain.



8 Challenge Fill in the beginning of each row and complete the table.

	9	12	20	
	13	16		15
		8	16	7
	81		400	
		128		105

Multiplying Large Numbers

NCTM Standards 1, 2, 9, 10

Complete the area model, puzzles, and records.

1

	400	20	8
20			
9			

$$428 \times 29 = \boxed{}$$

2

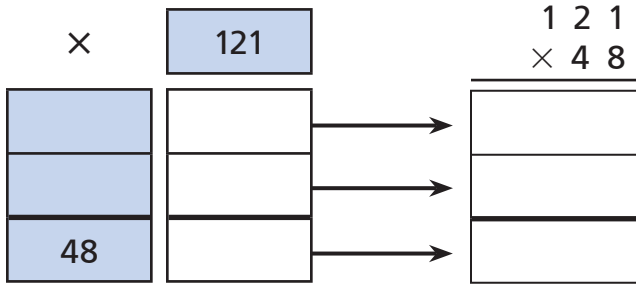
	×	100	30	5	135				
						135		→	<u>1 3 5</u>
						135		→	2 2
	22					135	22	→	

3

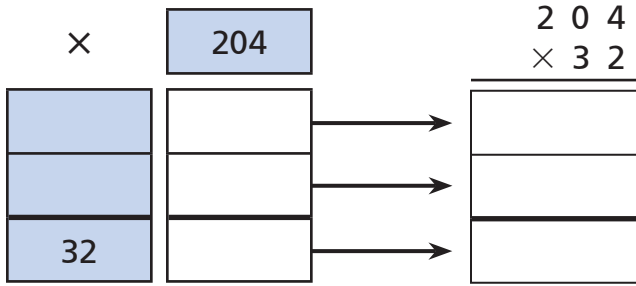
	×	200	40	6	246				
						246		→	<u>2 4 6</u>
						246		→	3 4
	34					246		→	

Use numbers from the puzzles in the records.
Use an area model if you wish.

4



5



6 There are 24 hours in a day, 7 days in a week, and 365 days in most years. How many hours are there in most years? Explain.

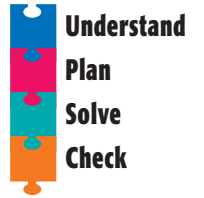
7 Challenge For each partial product, write the factors that produce it.

1 8 2	
× 4 7	
4700	×
3760	×
94	×
8,554	

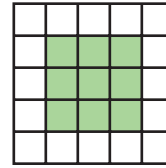
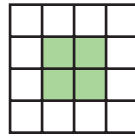
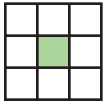
Problem Solving Strategy

Make a Table

NCTM Standards 1, 2, 6, 7, 8, 9, 10



- 1 Jenny made these designs with square tiles. Each design has a square of green tiles and a border of white tiles.



Circle the expressions that give the number of white tiles needed for a design with an $n \times n$ green square.

$$4n + 4$$

$$4 \times (n + 1)$$

$$2 \times (n + 2) + 2n$$

- 2 Here is a pattern of columns of tiles.



Here are some expressions.

$$2 \times (n - 1)$$

$$2n + 2$$

$$2n - 2$$

If n is the number of orange tiles, which expressions give the number of white tiles?

Problem Solving Test Prep

Choose the correct answer.

- 1 Which expression is equivalent to the one below?

$$a^2 - 4$$

- A. $(a + 4) \times (a - 4)$
B. $(a + 2) \times (a - 2)$
C. $(a + 16) \times (a - 16)$
D. $(a^2 - 2) \times 2$
- 2 Which is the only number of juice boxes that **cannot** be packed in each of the following ways?

groups of 3
packages of 6
cartons of 10

- A. 60 C. 90
B. 70 D. 120

- 3 Ricardo made this area model to multiply 347 and 56. Which partial product is missing from the model?

	300	40	7
50	15,000	■	350
6	1,800	240	42

- A. 20 C. 2,000
B. 200 D. 20,000
- 4 Which is the set of prime factors of 72?
- A. 2, 2, 2, 3, 3 C. 2, 3, 3, 3
B. 2, 2, 3, 3, 3 D. 2, 3, 3, 4

Show What You Know

Solve each problem. Explain your answer.

- 5 The school library received a shipment of books. There were 27 cartons of 12 books and 19 cartons of 17 books. How many books were in the shipment? Explain.

- 6 Jade has four unmarked rods that are 1 inch, 4 inches, 7 inches, and 9 inches long. How many different whole-number lengths up to 21 inches can she measure if she uses a rod only once to measure a length? Explain.

Review/Assessment

NCTM Standards 1, 2, 6, 7, 9

Write the partial products in the area models and complete the records. *Lesson 1*

1

	60	4
30		
8		

$$\begin{array}{r} 64 \\ \times 38 \\ \hline \end{array}$$

2

	100	30	6
40			
3			

$$\begin{array}{r} 136 \\ \times 43 \\ \hline \end{array}$$

Make up your own 2-digit by 2-digit multiplication sentences. *Lesson 1*

3 The product is between 2,000 and 3,000. Neither factor has a zero in the ones place.

$$\square\square \times \square\square = \square\square\square\square$$

4 The product is between 5,000 and 6,000. Neither factor has a zero in the ones place.

$$\square\square \times \square\square = \square\square\square\square$$

5 Complete the puzzles and the records. *Lessons 2, 3 and 5*

			58
67			

58	
58	
58	67

58	67

6

48	

$$\begin{array}{r} 29 \\ \times 48 \\ \hline \end{array}$$

7

56	

$$\begin{array}{r} 64 \\ \times 56 \\ \hline \end{array}$$

8

×	100	20	7	127				1 2 7 3 2
					127			
					127			
32					127	32		

Complete the table. Lesson 4

9	d	3	5			
	d^2			100		
	$d + 1$				21	51
	$d - 1$				24	49
	$(d + 1) \times (d - 1)$					2,499

Solve the problem. Show your work. Lesson 6

10 Brad used toothpicks to make a pattern of squares.



Circle the expressions that give the number of toothpicks needed to make n squares?

$2n + 1$ $3n + 1$ $2n + n + 1$ $4n$