

# Introducing Arrays

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

Use counting shortcuts to find the number of squares in each array.

1




2




3




4




5




6




7



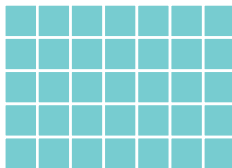

8



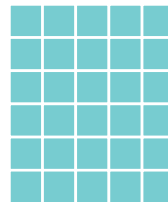

9



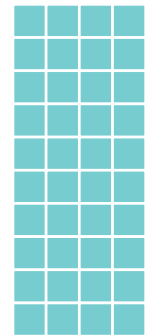

10




11




12




- 13 Mrs. Wu arranged the desks of her classroom into 4 rows of 7 desks. How many desks are there in her classroom? Show how you solved the problem with words, pictures, or numbers.

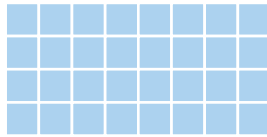
\_\_\_\_\_ desks

14 Use counting shortcuts to find the number of squares in each array.

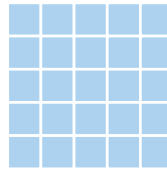
**A**



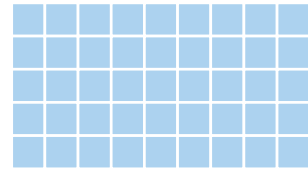

**B**



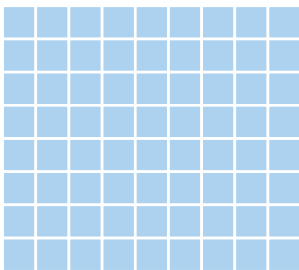

**C**



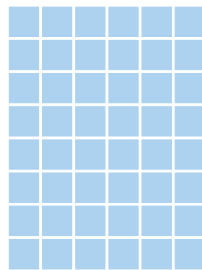

**D**



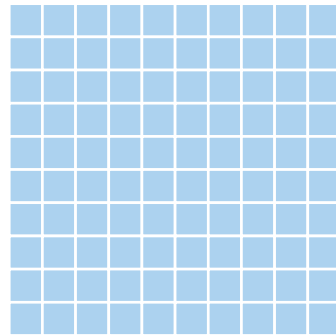

**E**




**F**




**G**




15 **Challenge** Write the letter of each of the above arrays A through G in the appropriate white box in the table. You will write some letters twice.

×	1	2	3	4	5	6	7	8	9	10
1										
2										
3									A	
4										
5										
6										
7										
8										
9										
10										

# Separating Arrays

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

Complete the diagrams and number sentences.

1

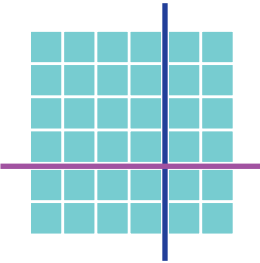


$1 \times 3$	
	$3 \times 2$

	2
9	

$$(1 \times 3) + (3 \times 3) + (1 \times 2) + (3 \times 2) = \boxed{20}$$

2

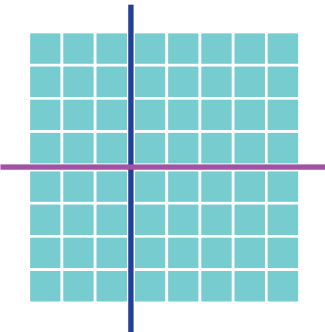


$4 \times 4$	

8	

$$(4 \times 4) + (2 \times 4) + (\square \times \square) + (2 \times 2) = \square$$

3

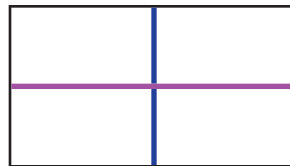
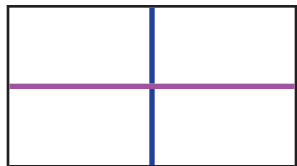
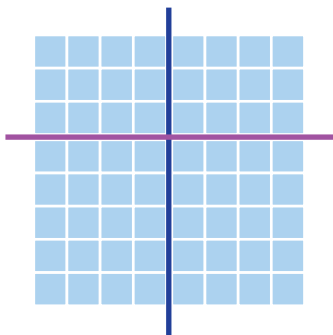


$4 \times 3$	

	20

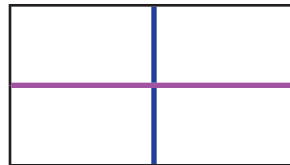
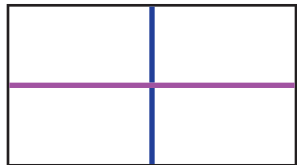
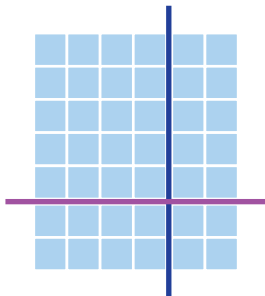
$$(4 \times 3) + (4 \times 3) + (4 \times 5) + (\square \times \square) = \square$$

4



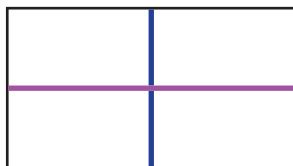
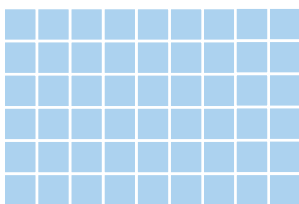
$$(\square \times \square) + (\square \times \square) + (\square \times \square) + (\square \times \square) = \square$$

5



$$(\square \times \square) + (\square \times \square) + (\square \times \square) + (\square \times \square) = \square$$

**6 Challenge** Separate the array into four sections and complete the diagrams.



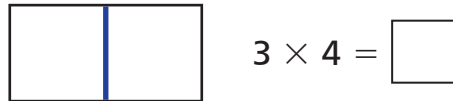
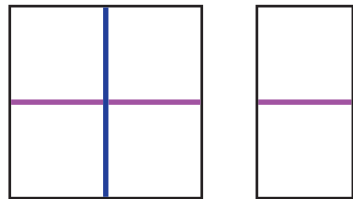
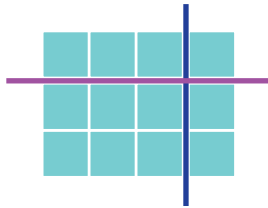
Write a number sentence to help find the total number of squares in the array.

# Adding Array Sections

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

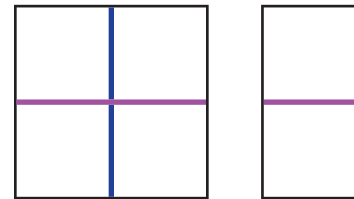
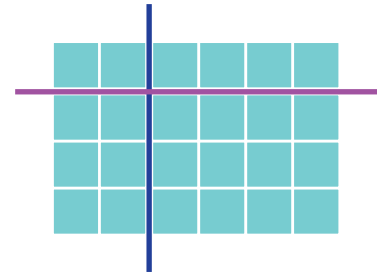
Complete the diagrams. Then find the number of squares in each array.

1



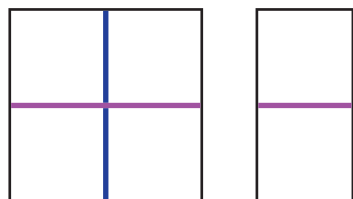
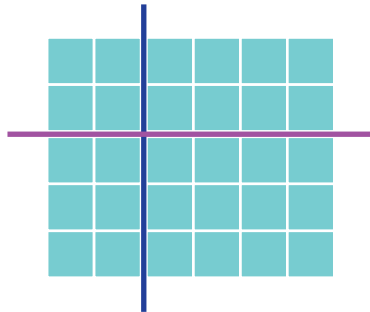
$3 \times 4 = \square$

2



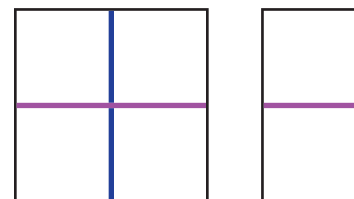
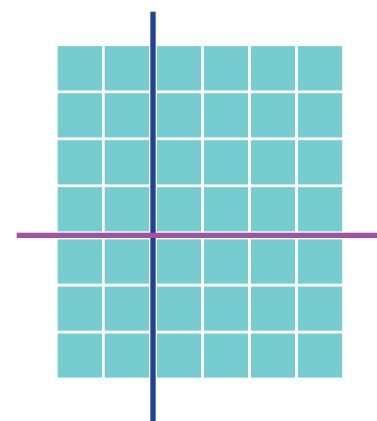
$4 \times 6 = \square$

3



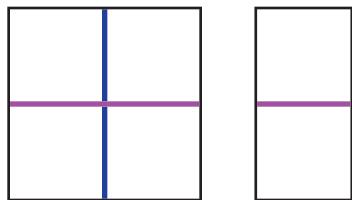
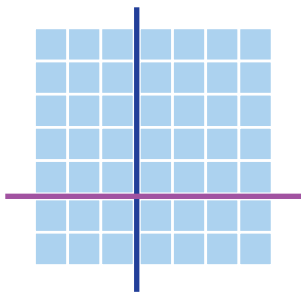
$5 \times 6 = \square$

4



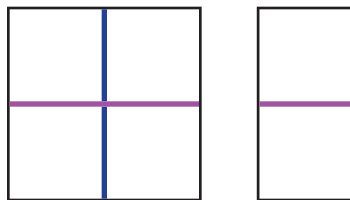
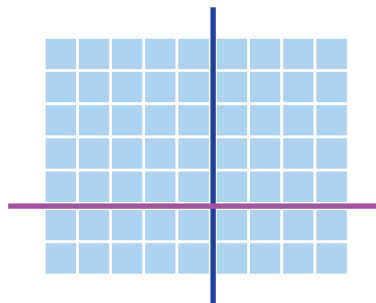
$7 \times 6 = \square$

5



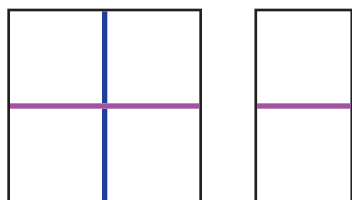
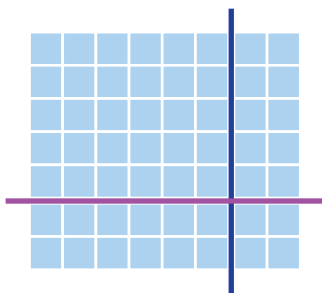
×  =

6



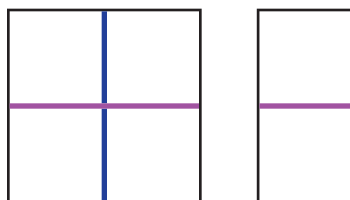
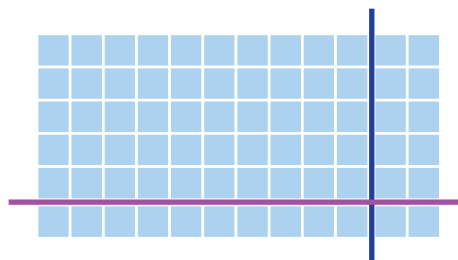
×  =

7



×  =

8



×  =

**9 Challenge** Mr. Jones bought 7 six-packs of yogurt. Mr. Gomez bought 4 six-packs of yogurt. How many yogurts do they have? Show how you solved the problem.

\_\_\_\_\_ yogurts

# Exploring a Multiplication Shortcut

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

Look for shortcuts in completing the tables and finding the number of squares in the arrays.

1

	6	2	8	10	11
× 2	12				

2

	2	5	9	0	10
× 3	6				

3

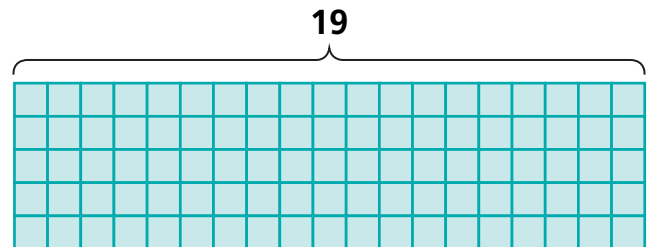
	1	3	5	6	8
× 2					
× 4					
× 6					

4

	2	0	10	6	9
× 3					
× 6					
× 9					

5

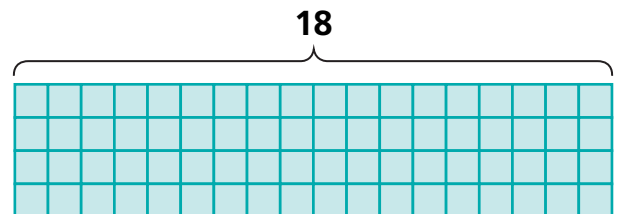
	1	4	5	9	10
× 5					



\_\_\_\_\_ squares

6

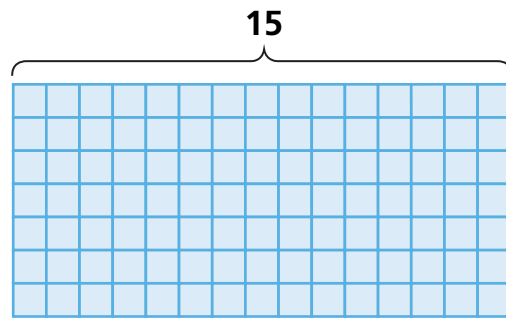
	3	4	7	8	11
× 4					



\_\_\_\_\_ squares

7

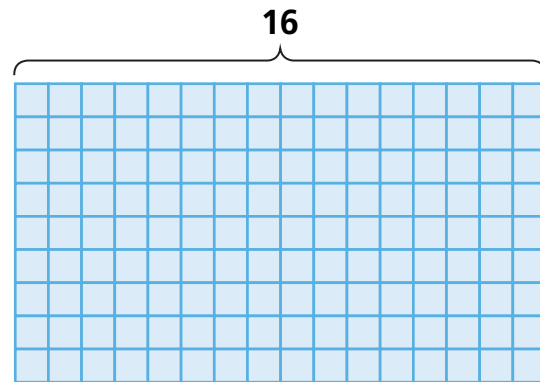
	3	4	5	7	12
$\times 7$					



\_\_\_\_\_ squares

8

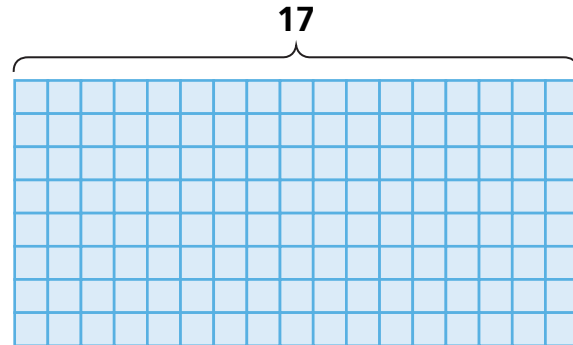
	2	3	5	8	11
$\times 9$					



\_\_\_\_\_ squares

9

	2	4	5	9	14
$\times 8$					



\_\_\_\_\_ squares

**10 Challenge** Sue wants to give 7 party favors to everyone at her party. There are 14 boys and 13 girls at her party. How many favors does she need? Explain your answer using numbers, pictures, or words.

\_\_\_\_\_ favors



## Using a Multiplication Shortcut

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

Fill in the addition and multiplication tables.  
Look for shortcuts to help you.

1

+	1	5	2	6	4	10
3				9		
1						
4			6			
5						
7						

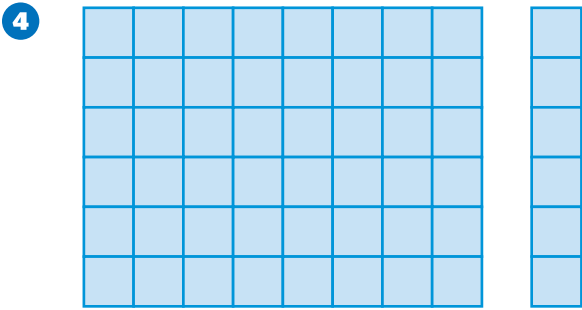
2

×	1	5	2	6	4	10
3						
1		5				
4			8			
5						
7						

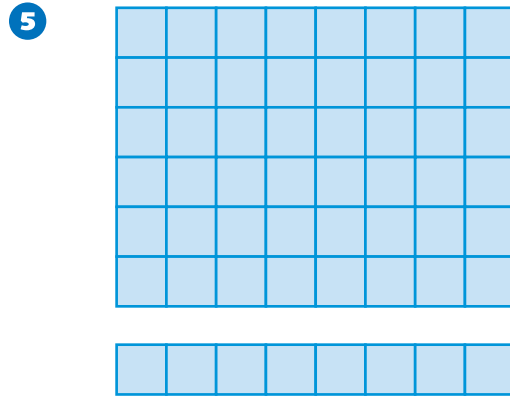
3

×	3	6	9	10	5	15
6						
2			18			
8						
9						

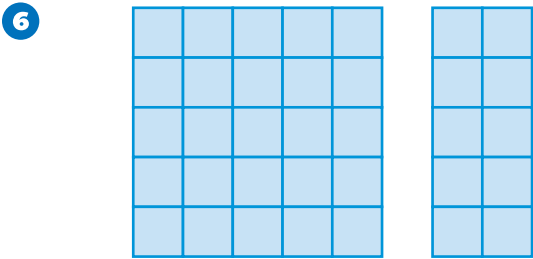
How many more squares are needed in an array when a factor is increased by 1 or 2? How many squares in all?



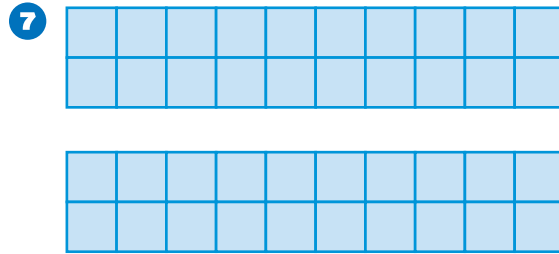
$$(6 \times 8) + 6 = \square$$



$$(\square \times \square) + \square = \square$$



$$(5 \times 5) + (\square \times \square) = \square$$



$$(\square \times \square) + (\square \times \square) = \square$$

**8 Challenge** Reese has 14 birds and 25 dogs. How many legs do her pets have? Show your work by writing a number sentence.

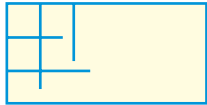
\_\_\_\_\_ legs

# Connecting Multiplication and Division

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

Find the missing numbers to complete the fact family.

1



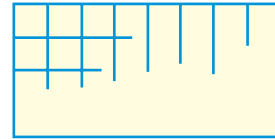
$$3 \times \square = 18$$

$$\square \times 3 = 18$$

$$18 \div 3 = \square$$

$$18 \div \square = 3$$

2



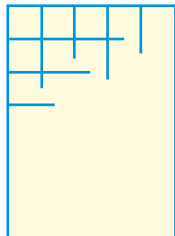
$$\square \times 8 = 32$$

$$8 \times \square = 32$$

$$32 \div \square = 8$$

$$32 \div 8 = \square$$

3



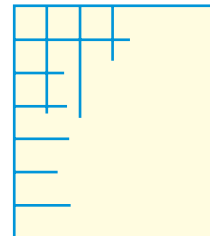
$$\square \times 5 = 35$$

$$5 \times \square = 35$$

$$35 \div \square = 5$$

$$35 \div 5 = \square$$

4



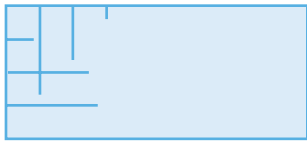
$$7 \times \square = 42$$

$$\square \times 7 = 42$$

$$42 \div 7 = \square$$

$$42 \div \square = 7$$

5



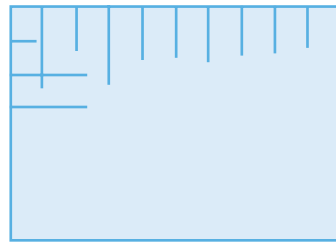
$$\square \times \square = 36$$

$$\square \times \square = 36$$

$$36 \div \square = \square$$

$$36 \div \square = \square$$

6



$$\square \times \square = 70$$

$$\square \times \square = 70$$

$$70 \div \square = \square$$

$$70 \div \square = \square$$

7



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

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

$$66 \div \square = \square$$

$$\square \div \square = \square$$

8



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

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

$$\square \div \square = \square$$

$$63 \div \square = \square$$

**9 Challenge** Gregory wants to arrange his 60 books on 5 shelves. He puts the same number of books on each shelf. How many did he put on each shelf? Explain your answer using numbers, pictures, or words.

\_\_\_\_\_ books on each shelf

# Arrays with Leftovers

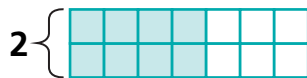
NCTM Standards 1, 2, 6, 7, 8, 9, 10

Fill in the missing numbers for the full columns and the tiles left over.

1

$$2 \overline{)8}$$

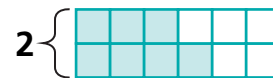
Number of full columns	4
Number of tiles left over	0



2

$$2 \overline{)7}$$

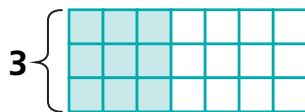
Number of full columns	
Number of tiles left over	1



3

$$3 \overline{)9}$$

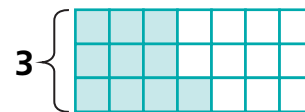
Number of full columns	
Number of tiles left over	



4

$$3 \overline{)10}$$

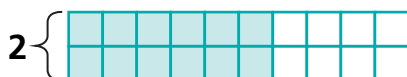
Number of full columns	
Number of tiles left over	



5

$$2 \overline{)12}$$

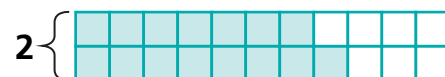
Number of full columns	
Number of tiles left over	



6

$$2 \overline{)15}$$

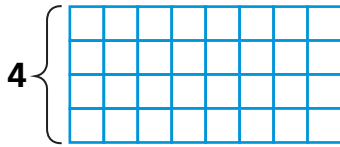
Number of full columns	
Number of tiles left over	



For each of the problems, find the arrangement of tiles with the greatest number of complete columns.

7

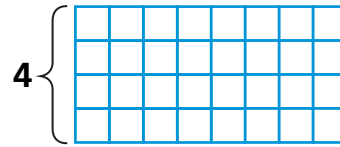
$$4 \overline{)12}$$



Number of total tiles	12	Number of full columns	
Number of tiles in a full column	4	Number of tiles left over	0

8

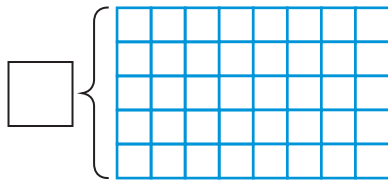
$$4 \overline{)18}$$



Number of total tiles	18	Number of full columns	4
Number of tiles in a full column	4	Number of tiles left over	

9

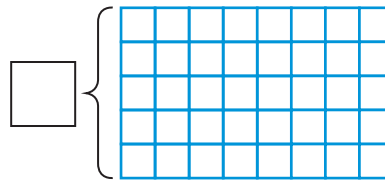
$$5 \overline{)17}$$



Number of total tiles	17	Number of full columns	
Number of tiles in a full column	5	Number of tiles left over	

10

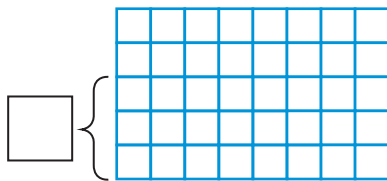
$$5 \overline{)24}$$



Number of total tiles	24	Number of full columns	
Number of tiles in a full column	5	Number of tiles left over	

11 Challenge

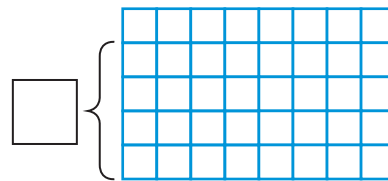
$$3 \overline{)16}$$



Number of total tiles	16	Number of full columns	
Number of tiles in a full column	3	Number of tiles left over	

12 Challenge

$$4 \overline{)14}$$



Number of total tiles	14	Number of full columns	
Number of tiles in a full column		Number of tiles left over	

# Working with Remainders

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

**Make a diagram of each arrangement and then complete the shorthand based on the diagram.**

**1**

$$\begin{array}{r} \boxed{3} \text{ r } \boxed{\phantom{00}} \\ \hline \boxed{2} \overline{) 7} \end{array}$$

**2**

$$\begin{array}{r} \boxed{\phantom{00}} \text{ r } \boxed{1} \\ \hline \boxed{3} \overline{) 7} \end{array}$$

**3**

$$\begin{array}{r} \boxed{1} \text{ r } \boxed{\phantom{00}} \\ \hline \boxed{4} \overline{) 7} \end{array}$$

**4**

$$\begin{array}{r} \boxed{\phantom{00}} \text{ r } \boxed{\phantom{00}} \\ \hline \boxed{4} \overline{) 10} \end{array}$$

**5**

$$\begin{array}{r} \boxed{3} \text{ r } \boxed{0} \\ \hline \boxed{\phantom{00}} \overline{) 9} \end{array}$$

**6**

$$\begin{array}{r} \boxed{\phantom{00}} \text{ r } \boxed{\phantom{00}} \\ \hline \boxed{5} \overline{) 14} \end{array}$$

**7**

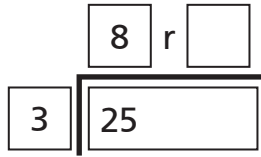
$$\begin{array}{r} \boxed{2} \text{ r } \boxed{2} \\ \hline \boxed{\phantom{00}} \overline{) 14} \end{array}$$

**8**

$$\begin{array}{r} \boxed{\phantom{00}} \text{ r } \boxed{\phantom{00}} \\ \hline \boxed{2} \overline{) 12} \end{array}$$

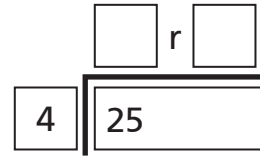
Complete the shorthand below. Complete the number sentences to check your answers. Draw diagrams if you wish.

9



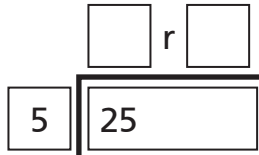
$$(\boxed{\phantom{00}} \times \boxed{\phantom{00}}) + \boxed{\phantom{00}} = 25$$

10



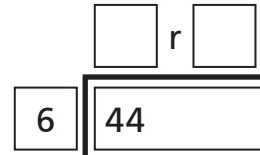
$$(\boxed{\phantom{00}} \times \boxed{\phantom{00}}) + \boxed{\phantom{00}} = 25$$

11



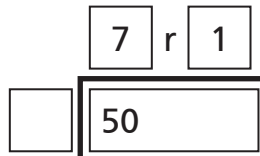
$$(\boxed{\phantom{00}} \times \boxed{\phantom{00}}) + \boxed{\phantom{00}} = 25$$

12



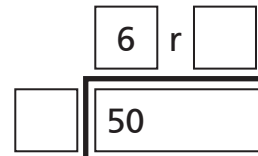
$$(\boxed{\phantom{00}} \times \boxed{\phantom{00}}) + \boxed{\phantom{00}} = 44$$

13 Challenge

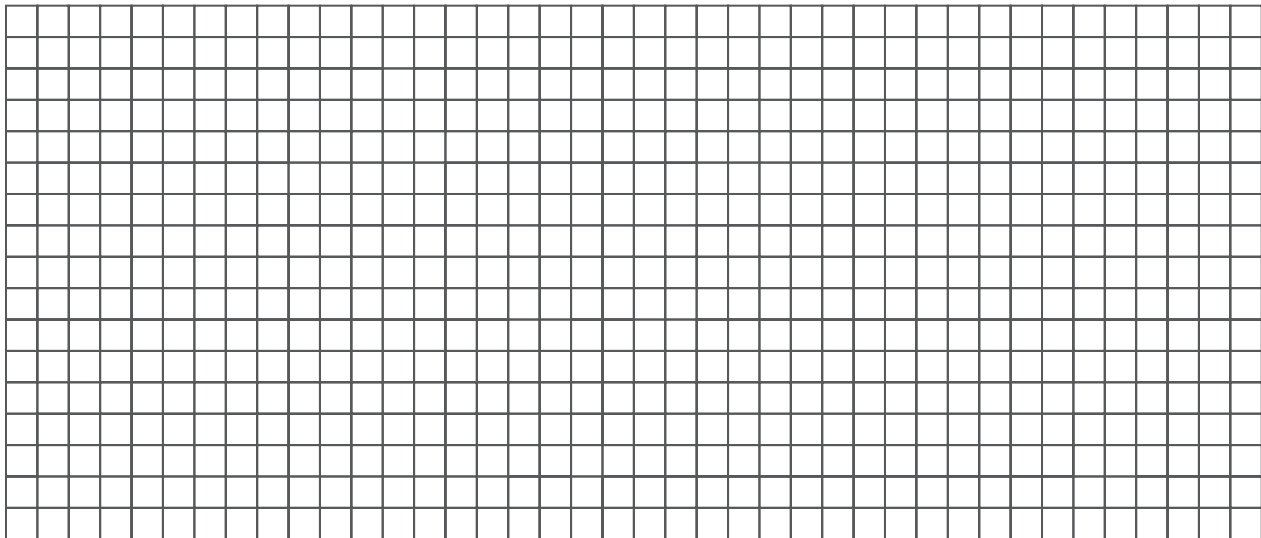


$$(\boxed{\phantom{00}} \times \boxed{\phantom{00}}) + \boxed{\phantom{00}} = 50$$

14 Challenge



$$(\boxed{\phantom{00}} \times \boxed{\phantom{00}}) + \boxed{\phantom{00}} = \boxed{\phantom{00}}$$

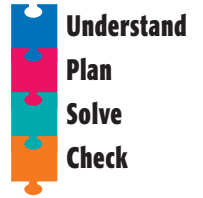




# Problem Solving Strategy

## Solve a Simpler Problem

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



**Solve each problem. Show your work.**

- 1 Each of the 19 members of the swim team swam 8 laps. How many laps did the team swim?

\_\_\_\_\_ laps

- 2 Joey ate 13 pumpkin seeds on each of the 31 days in October. How many pumpkin seeds did he eat in October?

\_\_\_\_\_ seeds

- 3 Mrs. Mann gave each of her 21 students a box of crayons. Each box had 16 crayons. How many individual crayons did Mrs. Mann give her students?

\_\_\_\_\_ crayons

- 4 Mr. Zee bought some supplies for his class. The books cost \$19.95, the markers cost \$8.95, the paper cost \$11.07, and the rulers cost \$7.89. Mr. Zee quickly tried to figure out the cost so he knew which dollar bills to pay with. About how much will everything cost?

\$ \_\_\_\_\_

# Problem Solving Test Prep

Choose the correct answer.

- 1 The table below represents the cost of pencils at a school store. Todd wants to buy 6 pencils. How much money will he need?

PENCIL COSTS	
Number of Pencils	Cost
1	6¢
2	12¢
3	18¢

- A. 24¢                      C. 36¢  
B. 30¢                      D. 42¢

- 2 Tomas is learning about multiplying by multiples and wants to solve this riddle.

I am a multiple of 10 and when you multiply me by 4, you get 400.

Which multiple solves this riddle?

- A. 100  
B. 40  
C. 10  
D. 4

## Show What You Know

Solve each problem. Explain your answer.

- 3 Nic has a secret number,  $k$ . He wrote a clue on the chalkboard for his classmates.

$$k + (6 \times 2) = 17$$

What is Nic's secret number? Explain.

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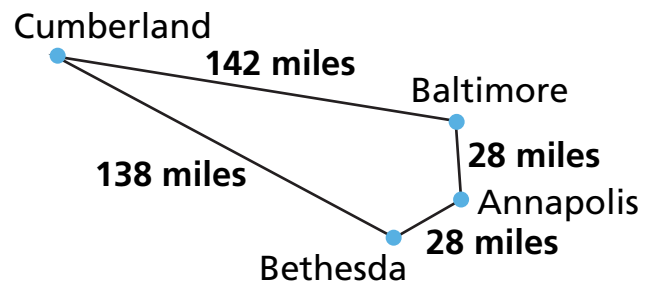
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- 4 About how much farther is it from Baltimore to Bethesda if you travel through Cumberland than if you travel through Annapolis? Explain.



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## Review/Assessment

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

Find the number of squares in each array. *Lesson 1*

1



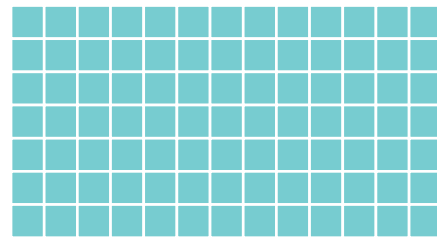
2



3 Complete the table. Find the total number of squares in the array. Then explain how you got your answer. *Lesson 4*

	2	3	4	5	8	10
$\times 7$						

$$7 \times 13 = \square$$




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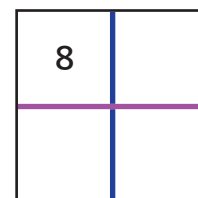
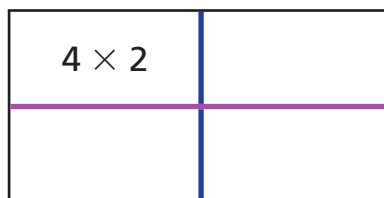
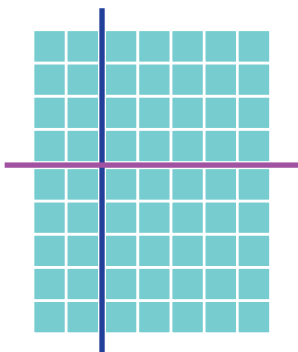


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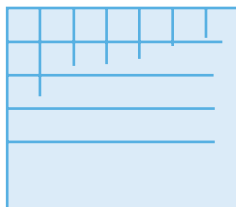
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4 Use the array to complete the diagrams. Find the total number of squares in the array. *Lessons 2 and 3*



$$9 \times 7 = \square$$

- 5 Find the missing numbers to complete the fact family. **Lesson 6**

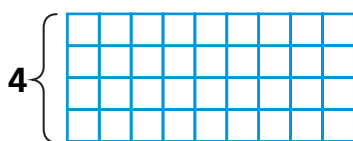


$$\begin{array}{l} \square \square = 42 \\ \square \times \square = 42 \\ 42 \div \square = \square \\ 42 \div \square = \square \end{array}$$

Shade the tiles to show the arrangement with the largest number of full columns. Then complete the tables. **Lesson 7**

6

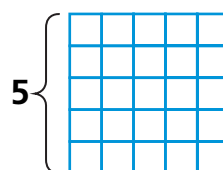
$$4 \overline{)29}$$



Number of full columns	
Number of tiles left over	

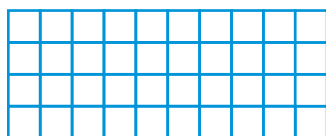
7

$$5 \overline{)13}$$



Number of full columns	
Number of tiles left over	

- 8 Use the array to complete the shorthand below. Then complete the division and multiplication number sentences to check your answer. **Lesson 8**



$$\begin{array}{r} \square r \square \\ 4 \overline{)37} \end{array}$$

$$(\square \times \square) + \square = 37$$

Solve the problem. Explain your answer. **Lesson 9**



- 9 Each member of the club has 23 cards. If the 8 members each bring all their cards to a meeting, how many cards are there all together? Explain.

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