Name _____ Date/Time _____

Recognizing Rectangular Arrays

NCTM Standards 1, 2, 6, 8, 10

How many dots?

1 ⬤
`1`

2 ⬤⬤
☐

3 ⬤⬤⬤
☐

4 ⬤⬤⬤⬤
☐

5 ⬤
⬤
☐

6 ⬤⬤
⬤⬤
☐

7 ⬤⬤⬤
⬤⬤⬤
☐

8 ⬤⬤⬤⬤
⬤⬤⬤⬤
☐

9 ⬤
⬤
⬤
☐

10 ⬤⬤
⬤⬤
⬤⬤
☐

11 ⬤⬤⬤
⬤⬤⬤
⬤⬤⬤
☐

12 ⬤⬤⬤⬤
⬤⬤⬤⬤
⬤⬤⬤⬤
☐

13 ⬤
⬤
⬤
⬤
☐

14 ⬤⬤
⬤⬤
⬤⬤
⬤⬤
☐

15 ⬤⬤⬤
⬤⬤⬤
⬤⬤⬤
⬤⬤⬤
☐

16 ⬤⬤⬤⬤
⬤⬤⬤⬤
⬤⬤⬤⬤
⬤⬤⬤⬤
☐

17 Sometimes the same array is shown in two problems above. List the pairs of problems that have the same array and explain why the pairs match.

_____

_____

_____

18 In the third grade classroom, there are 4 rows of chairs. Each row has 3 chairs. How many chairs are in the classroom? Draw a picture to show how you solve the problem. Write a number sentence to show your answer.

☐ chairs in the classroom

How many dots?

19

☐ ☐ ☐ total

20

☐ ☐ ☐ total

21
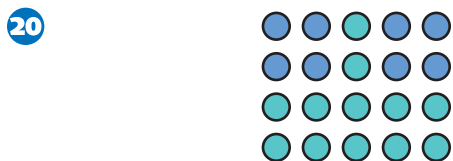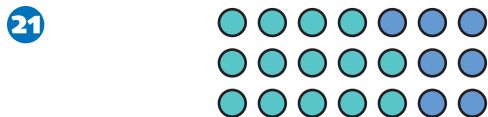
☐ ☐ ☐ total

22 Challenge

☐ ☐ ☐ ☐ total

Name _____   Date/Time _____
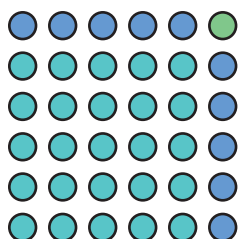
Arrays of Square Tiles

NCTM Standards 1, 2, 6, 10

**Count the number of square tiles in each part
of the array. Write an addition sentence to show
the number of tiles in the picture.**

1 ▢▢▢▢▢▢▢ ▢▢▢

　　▢ ＋ ▢ ＝ ▢

2 ▢▢▢▢▢▢▢▢▢▢

　　▢ ＋ ▢ ＝ ▢

3 ▢▢▢▢▢▢▢▢

　　▢ ＋ ▢ ＝ ▢
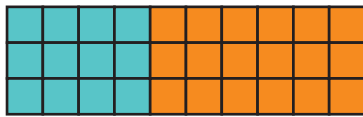
4 ▢▢▢▢▢▢▢▢

　　▢ ＋ ▢ ＝ ▢
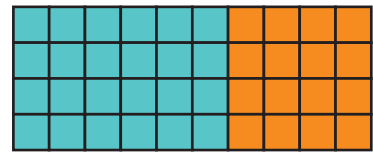
5 ▢▢▢▢▢▢▢▢▢

　　▢ ＋ ▢ ＝ ▢
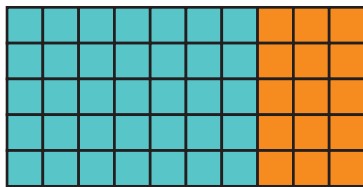
6 Jake put 15 chairs into 3 equal
rows. How many chairs were
in each row? Draw a picture
to show how you solved the
problem. Write a number
sentence to show your answer.

▢ chairs in each row

Using vertical or horizontal lines, cut each figure into 2 or 3 rectangular arrays. Write an addition sentence about your picture.

7
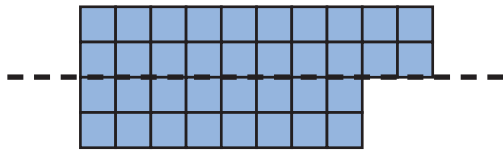
```
20    16    36
```

8
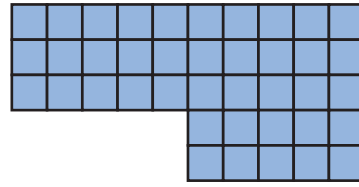
9
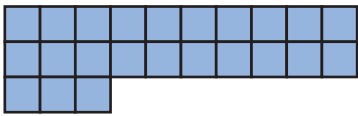
10
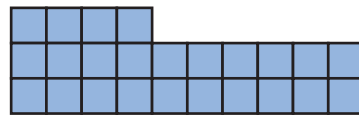
11
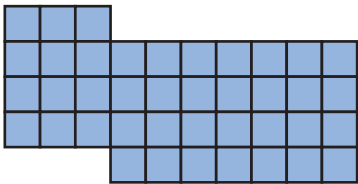
12
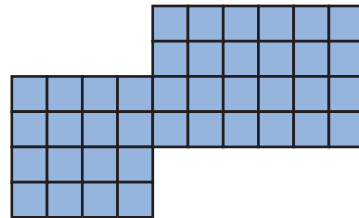
13 Challenge

14 Challenge

Chapter 2
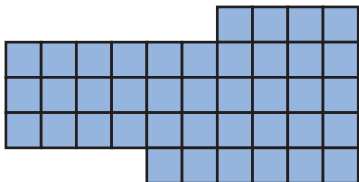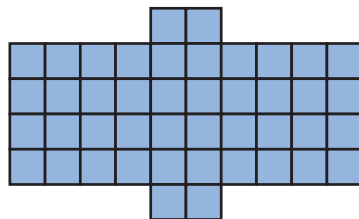
Lesson 3 # Intersecting Lines

NCTM Standards 1, 2, 6, 7, 8, 9, 10
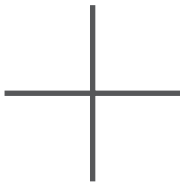
Use the maps to complete the table.

1 Maps with **1** street

A   **B**

	A	B
Horizontal	0	
Vertical	1	
Intersections	0	

2 Maps with **2** streets

A   **B**   **C**

	A	B	C
Horizontal			
Vertical			
Intersections			

3 Draw maps with **3** streets. Then complete the table.

A   **B**   **C**   **D**

	A	B	C	D
Horizontal	0	1	2	3
Vertical	3	2		
Intersections			2	0

4 Draw maps with **4** streets. Then complete the table.

A   B |||| C ||| D

E Draw the missing **4**-street map.

	A	B	C	D	E
Horizontal	0		2		
Vertical				1	
Intersections		3	4	3	

5 Draw maps with **5** streets. Then complete the table.

A   B |||| C   D ||||| E

F Draw the missing **5**-street map.

	A	B	C	D	E	F
Horizontal	3		5			
Vertical					1	
Intersections	6	4	0	0	4	

6 Challenge Terrance draws a map with 7 intersections. How many streets does his map have? Use numbers, pictures, or words to explain your answer.

_____

_____

Name _____ Date/Time _____

Visualizing Intersections

NCTM Standards 1, 6, 10

How many horizontal lines? How many vertical lines? How many intersections?

1
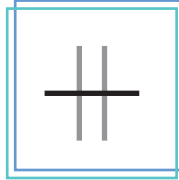
—	1
|	2
+	2

2

—	
|	
+	
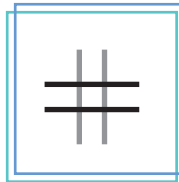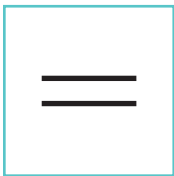
3

—	
|	
+	
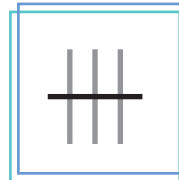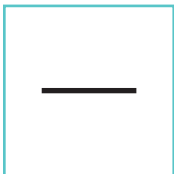
4

—	
|	
+	
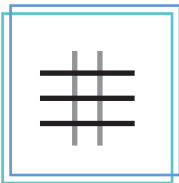
5

—	
|	
+	
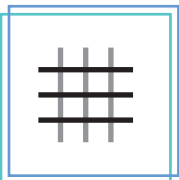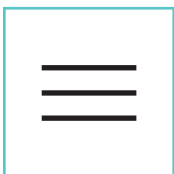
Solve the problem.

6 Yuji drew 4 horizontal lines on a transparency.
Sandra drew some vertical lines on a transparency.
They stacked their transparencies and counted
8 intersections. How many vertical lines did Sandra draw? _____

7 Each circle touches two sets of lines. In each circle,
write the number of intersections you would see
if the two sets of lines were both part of the
same map.
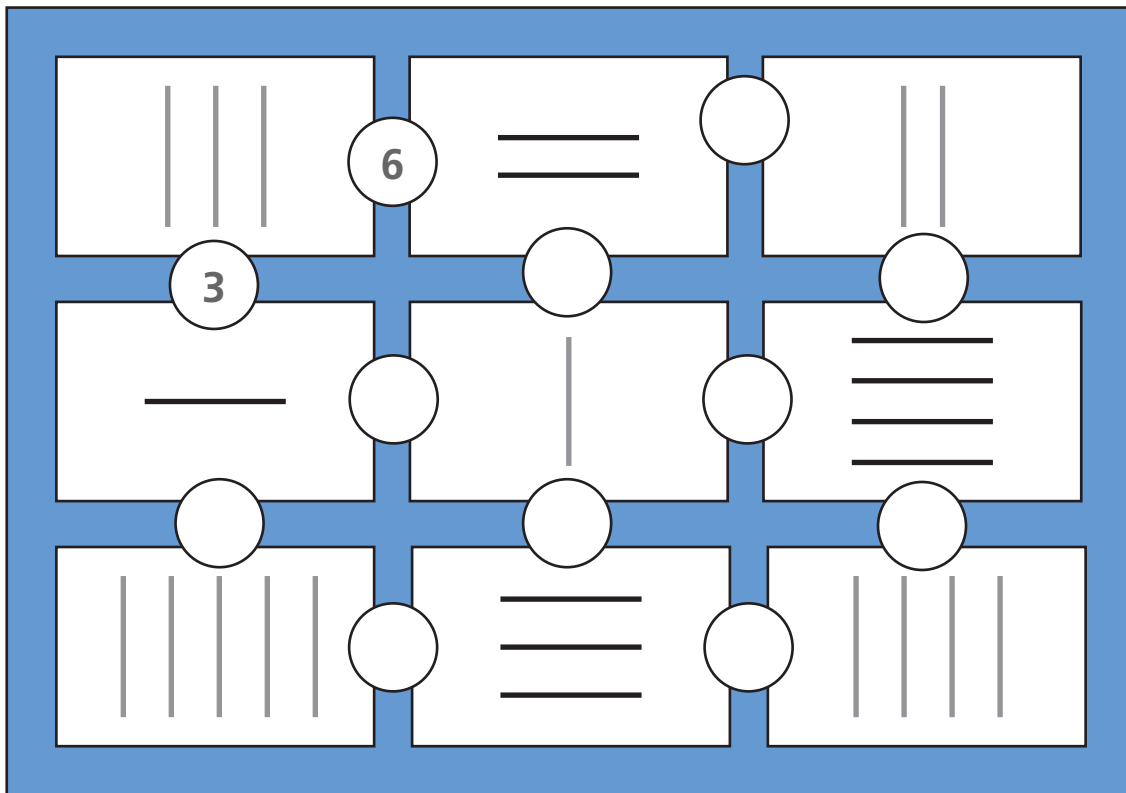
8 Challenge Complete the table.

—	2		4	3	
|		3	4		2
+	6	9		12	8

Finding the Number of Intersections

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

Name _____ Date/Time _____

Fill in the missing numbers or the missing maps.

1
2
4
6
4
2 8

KEY

▢	Horizontal
▢	Vertical
▢	Number of lines
▢	Number of intersections

2
5
1
6
1
5

3
1
3
4
3
1

4
4
3

5
1
1

6 A tiny town has **6** streets and **8** intersections. Draw a map of the town. Explain how you found your answer.

_____

_____

Use the information in the table and in the pictures to complete the maps and fill in the table.

7

8

9

10
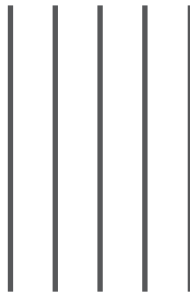
11
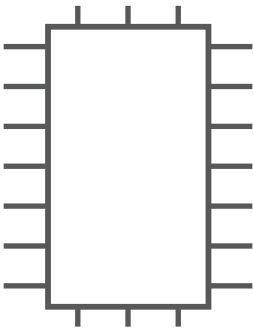
12

13
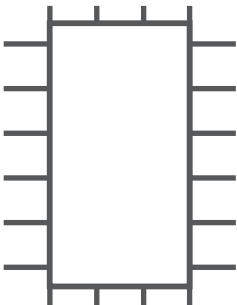
14 **Challenge**

7	3		
8		5	
9		4	
10	6		
11	7	3	
12	3		18
13	6	4	
14			5

Name _____ Date/Time _____

Pairing Objects

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

List all the pairs. Write the number of pairs.

1 e   f   g   M   N   O   P

gM

fM   gN

_____ pairs

2 R   S   T   U   j   k

Tk

Rj

_____ pairs

3 1   2   3   A   B   C

1A

2C

_____ pairs

Pizza Workshop
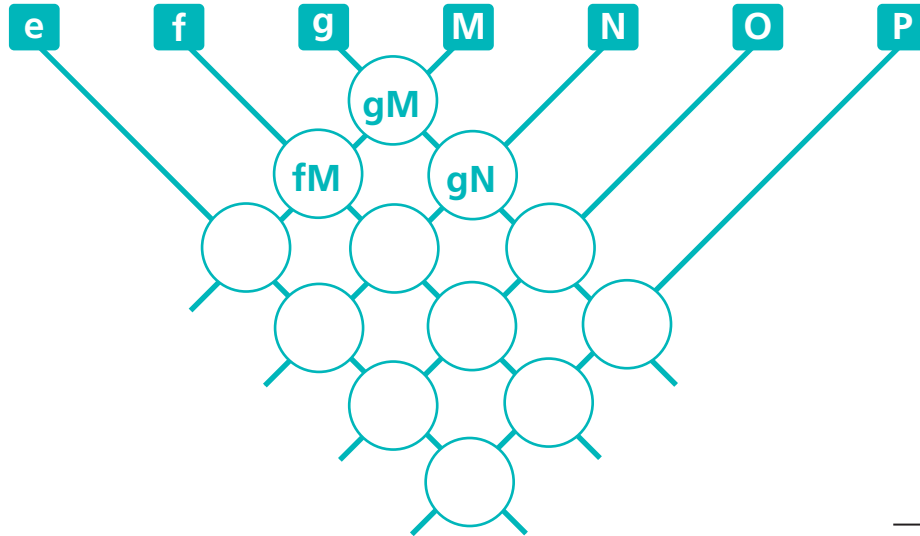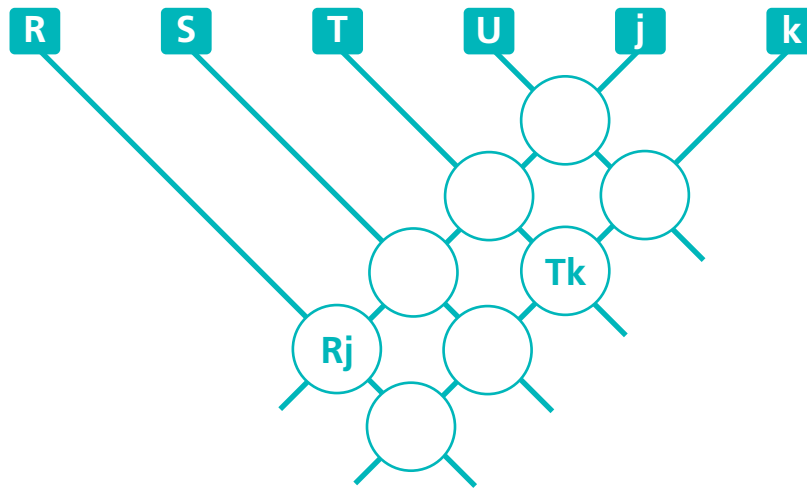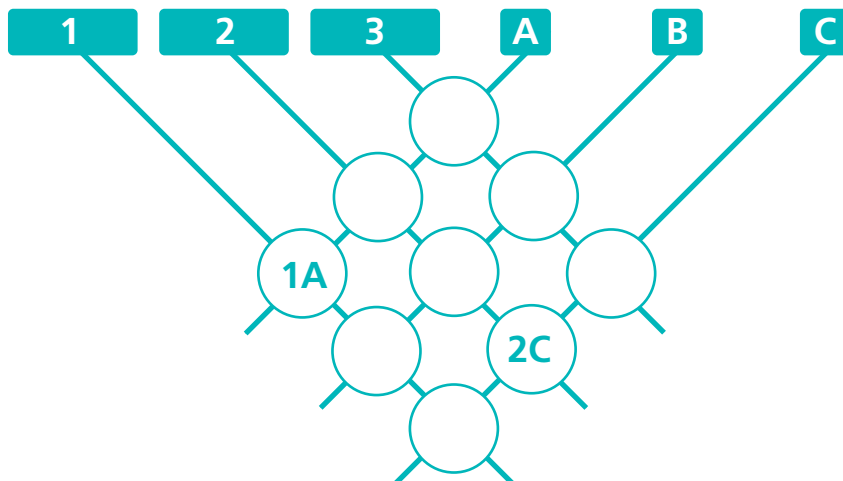
Vegetables	Meat	Crust
green peppers	pepperoni	thick
onions	sausage	thin
black olives	ham	
mushrooms		

4 How many different pizzas can you make if you choose one kind of crust and one kind of meat?

thicK   thiN   pepperoni   sausage   ham

Np
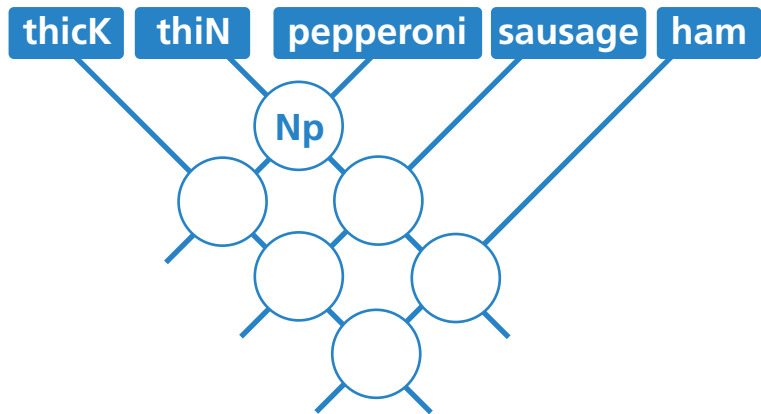
_____ pizzas

5 Customers can order a thin crust pizza with one meat and one vegetable. How many choices do the customers have?

_____ choices

6 **Challenge** How many thin crust pizzas can you make with three kinds of vegetables and no meat? Explain how you know.

_____

_____

Name _____ Date/Time _____

Listing Combinations

NCTM Standards 1, 2, 6, 9, 10

List all of the two-digit numbers by using a tens digit from the shaded box and a ones digit from the white box.

1

4, 7	0

4	0	7	0	✕	✕

2 two-digit numbers

[ ] × **1** = [ ]

choices for the tens digit × choices for the ones digit = number of two-digit numbers

2

4, 5	0, 1, 2, 3

(grid of four two-digit cells)

[ ] two-digit numbers

[ ] × [ ] = [ ]

choices for the tens digit × choices for the ones digit = number of two-digit numbers

3

1, 2, 3	1, 2, 3

(grid of two-digit cells)

[ ] two-digit numbers

[ ] × [ ] = [ ]

choices for the tens digit × choices for the ones digit = number of two-digit numbers

One Sandwich with One Topping

Hamburger	**Onions**
Hot Dog	**Ketchup**
Fish	**Mustard**
	Pickles

4 Predict the number of combinations of one kind of sandwich with one kind of topping.

[ ]	[ ]	[ ]
sandwiches	toppings	combinations

5 List all the combinations for one kind of sandwich with one topping.

[ ]	with	[ ]	[ ]	with	[ ]
[ ]	with	[ ]	[ ]	with	[ ]
[ ]	with	[ ]	[ ]	with	[ ]
hamburger	with	pickles	[ ]	with	[ ]
[ ]	with	[ ]	[ ]	with	[ ]
[ ]	with	[ ]	[ ]	with	[ ]

6 Challenge Donna will not eat pickles or onions. Write a multiplication sentence to find the number of combinations of one kind of sandwich with one topping that Donna will eat.

7 Challenge Dino will not eat hot dogs or hamburgers. Write a multiplication sentence to find the number of combinations of one kind of sandwich with one topping that Dino will eat.

Chapter 2
Lesson 8

Using Multiplication
NCTM Standards 1, 2, 6, 8, 9, 10

Write a multiplication sentence to describe each array.

1

☐ rows ☐ columns ☐ dots

2

☐ rows ☐ columns ☐ dots

3

☐ rows ☐ columns ☐ dots

4
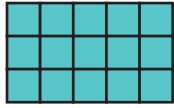
☐ rows ☐ columns ☐ tiles

5

☐ rows ☐ columns ☐ tiles

6

☐ rows ☐ columns ☐ tiles

7

☐ rows ☐ columns ☐ dots

8

☐ rows ☐ columns ☐ dots

9

☐ rows ☐ columns ☐ dots

10

☐ rows ☐ columns ☐ dots

11

☐ rows ☐ columns ☐ dots

12

☐ rows ☐ columns ☐ dots

13

☐ rows ☐ columns ☐ tiles

14

☐ rows ☐ columns ☐ tiles

15

☐ rows ☐ columns ☐ tiles

Complete the diagram. Write a multiplication sentence to match.

16

A   I   O   x   y

☐ ☐ ☐

17

T   M   oo   op

☐ ☐ ☐
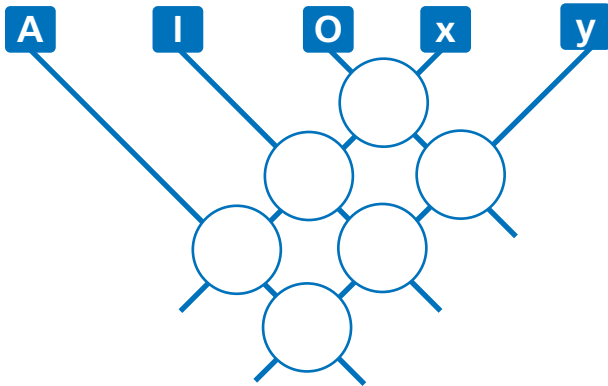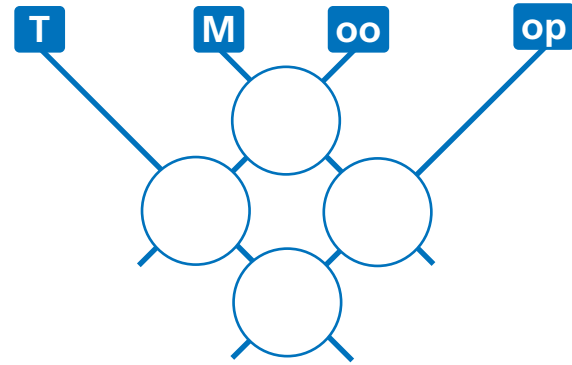
18 Min has three kinds of ice cream and two kinds of toppings. How many different one flavor–one topping sundaes can she make? Use words, pictures, or numbers to explain your answer.

sprinkles hot fudge vanilla chocolate strawberry

_____ sundaes

19 Challenge If Min gets two new toppings and one new flavor of ice cream, how many one flavor–one topping sundaes can she make with all of the flavors and toppings she has now? Use words, pictures, or numbers to explain your answer.

Writing Number Sentences for Intersecting Lines

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

Name _____   Date/Time _____

Fill in the blanks.

1
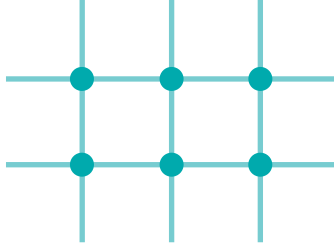
Number of lines: ☐

| 2 | 3 | ☐ |

Number of intersections: ☐

| 2 | 3 | ☐ |
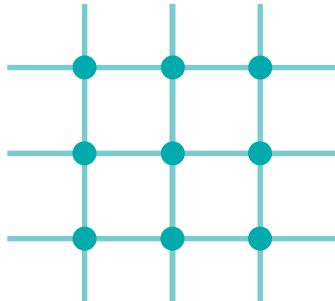
2

Number of lines: ☐

| ☐ | ☐ | ☐ |

Number of intersections: ☐

| ☐ | ☐ | ☐ |

3

Number of lines: ☐

| ☐ | ☐ | ☐ |

Number of intersections: ☐

| ☐ | ☐ | ☐ |
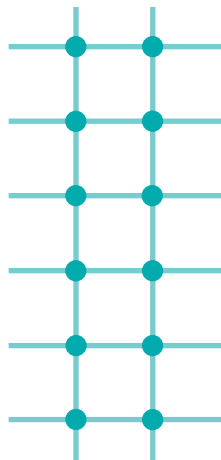
Complete the maps and the number sentences.

4

6		9
6		

5

	3	
	3	15

6
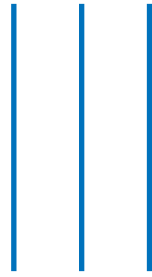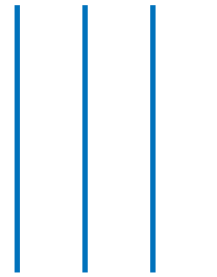
	4	
	4	16

7 Phillip drew a map with **8** intersections. When he added the number of streets, he got an even number. Describe Phillip's map.

_____

_____

_____

_____

_____

_____

---

8 **Challenge** Find all the ways to make **24** intersections.

vertical horizontal

		24
		24
		24

		24
		24
		24

		24
		24

Name _____ Date/Time _____

Breaking Products into Factors
NCTM Standards 1, 2, 6, 7, 9, 10

A map has 14 intersections and 2 vertical streets.

1 Draw the map.

2 How many horizontal streets are there?

☐ horizontal streets

3 Solve.

2 ☐ 14   14 2 ☐

16 dots are arranged in a rectangular array. The array has 4 rows.

4 Draw the array.

5 How many columns are there?

☐ columns

6 Solve.

4 ☐ 16   16 4 ☐

6 boys are sharing 18 pretzels.

7 Draw a picture to show how many pretzels each boy would get.

Each boy gets ☐ pretzels.

8 Solve.

6 ☐ 18   18 6 ☐

For each number of intersections, draw a map and complete the multiplication sentence.

9   15 intersections

☐ ☐ = 15

10   9 intersections

☐ ☐ = 9

11   10 intersections

☐ ☐ = 10

12   21 intersections

☐ ☐ = 21

13 **Challenge** Draw all the maps with **12 intersections.**

List all the factors of **12:** _____

Separating Arrays

NCTM Standards 1, 2, 7, 9, 10

Name _____ Date/Time _____

Write a multiplication sentence for each part of the big array. Find the number of the tiles in the parts to finish the multiplication sentence for the big array.

1
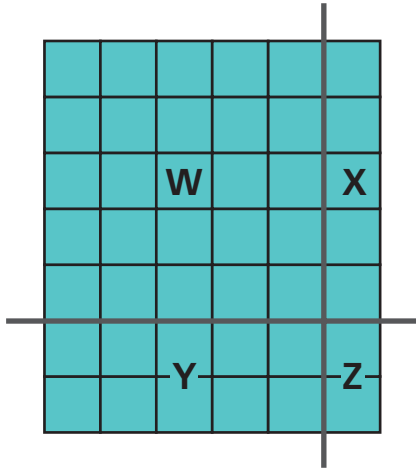
W: 5   5   ☐

X: 5   1   ☐

Y: 2   5   ☐

Z: 2   1   ☐

W   X   Y   Z   ☐

7   6   ☐

2
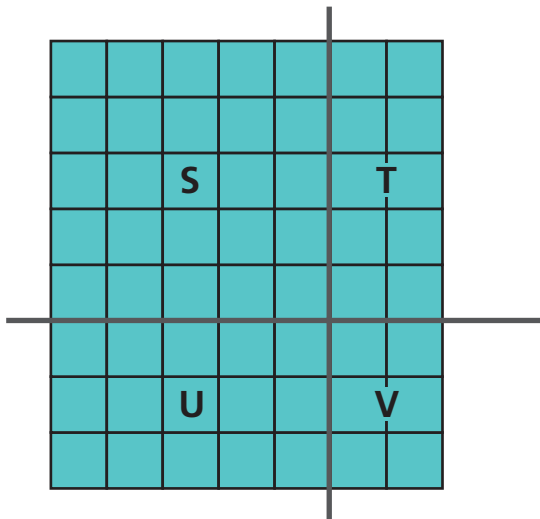
S: ☐ ☐ ☐

T: ☐ ☐ ☐

U: ☐ ☐ ☐

V: ☐ ☐ ☐

S   T   U   V   ☐

☐ ☐ ☐

Separate each array into two, three, or four parts. Label each part with its number of tiles. Find the sum of the tiles in the parts to finish the multiplication sentence for the big array.

3

11	11	

4

7	12	

5

	12	

6

11		
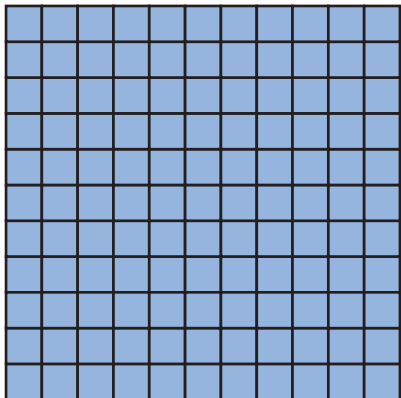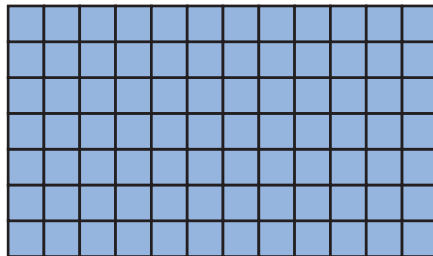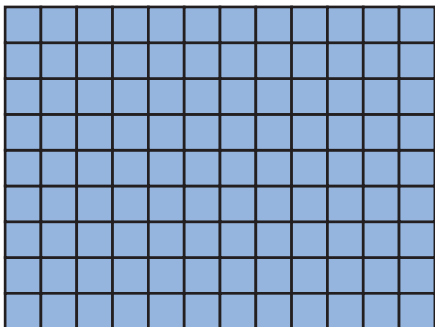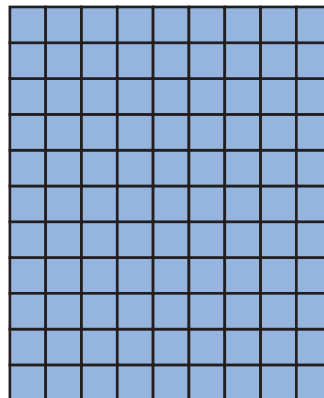
7 Challenge Fill in the missing numbers in this number sentence. (Think about separating a big array into parts.)

(10   10)   (4   ☐)   (☐   10)   (3   ☐)   14   13

Chapter 2
Lesson 12

Problem Solving Strategy
Draw a Picture
NCTM Standards 1, 6, 7, 8, 9, 10

Understand
Plan
Solve
Check

Solve each problem. Use the large white space to draw a picture if you want.

1 The Writing Store has pens, pencils, crayons, chalk, and markers. Each writing tool comes in blue, green, and red. How many different items do they sell?

_____

2 Max has 27 pennies. He makes 3 equal stacks. How many pennies are in each stack?
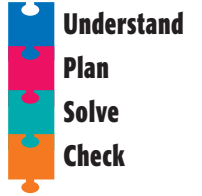
_____

3 Leticia begins her art project by drawing 7 lines on her paper. She draws some horizontal lines and some vertical lines. How many intersections can she make with the 7 lines?

_____

4 Connor needs 30 batteries for his science project. There are 4 batteries in 1 package. If he buys 7 packages, will he have enough batteries? Explain.
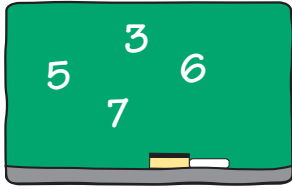
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Problem Solving Test Prep
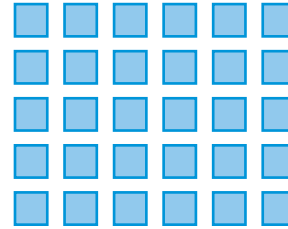
Choose the correct answer.

1 Miss Reef wrote these four digits on the board:

What is the largest possible four-digit number you can write with these digits?

A. 5,367　　　　**C.** 7,563

B. 6,357　　　　**D.** 7,653

2 Which number completes the number sentences?

5 ■　　30, 30　　5 ■

A. 6　　　　　　**C.** 1

B. 5　　　　　　**D.** 0

✏ Show What You Know

Solve each problem. Explain your answer.

3 Mr. Gomez will give his son 1 type of fruit and 1 type of cereal for breakfast. He can choose from 3 types of fruit and 2 types of cereal. How many different combinations of 1 fruit and 1 cereal are possible? Explain how you know.
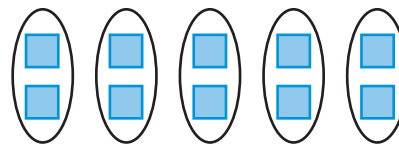
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_____

4 What multiplication sentence can you write for
2　2　2　2　2　10?
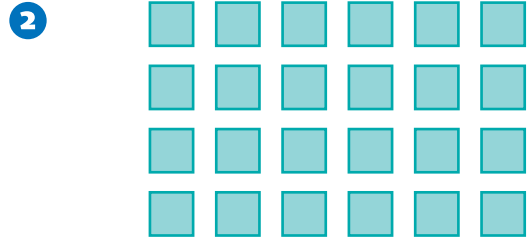Explain how you know.

_____

_____

_____

_____

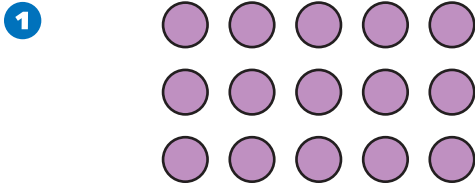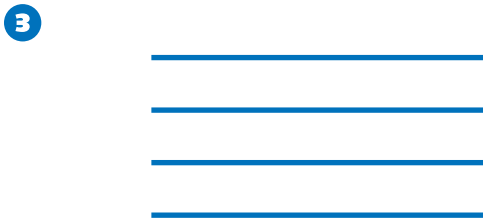**Chapter 2** **Review/Assessment**

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

Write the number of dots or tiles in each picture. Lessons 1, 2, and 11

1

_____

2

_____

Complete the map and the table. Lessons 3, 4, and 5

3

Horizontal	4
Vertical	5
Intersections	

4
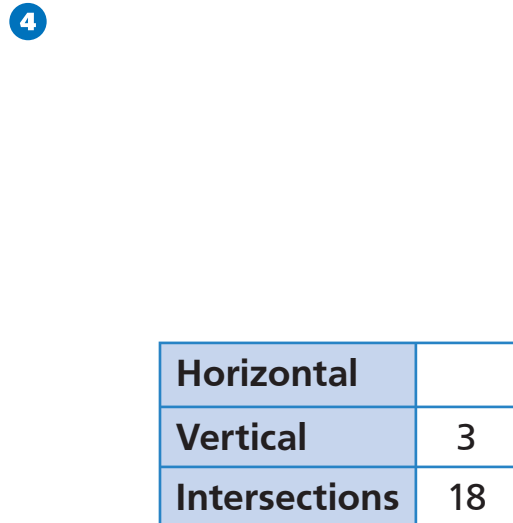
Horizontal	
Vertical	3
Intersections	18

5 There are 4 hikers and 2 bicyclists.
Every hiker shakes hands with every bicyclist.
How many handshakes are there? Lessons 6 and 7   _____ handshakes

6 Find all the two-digit numbers with a tens digit from the shaded box and a ones digit from the white box. **Lessons 6 and 7**

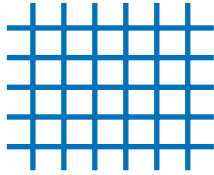| 3, 6	0, 2, 4

_____ two-digit numbers

Write a multiplication sentence for Problems 7 and 8. Lessons 8 and 9

7

⦾⦾⦾⦾⦾⦾⦾

☐ ☐ ☐

8

☐ ☐ ☐

9 9 dots are arranged in a rectangular array. The array has 3 rows. Draw the array. **Lesson 10**

Solve: 3 ☐ 9

10 A map has 14 intersections and 2 horizontal streets. Draw the map. **Lesson 10**

Solve: 2 ☐ 14

Solve the problem. Lesson 12

11 Three girls are sharing 27 grapes. They each will get the same amount. How many grapes will each girl get?

_____ grapes