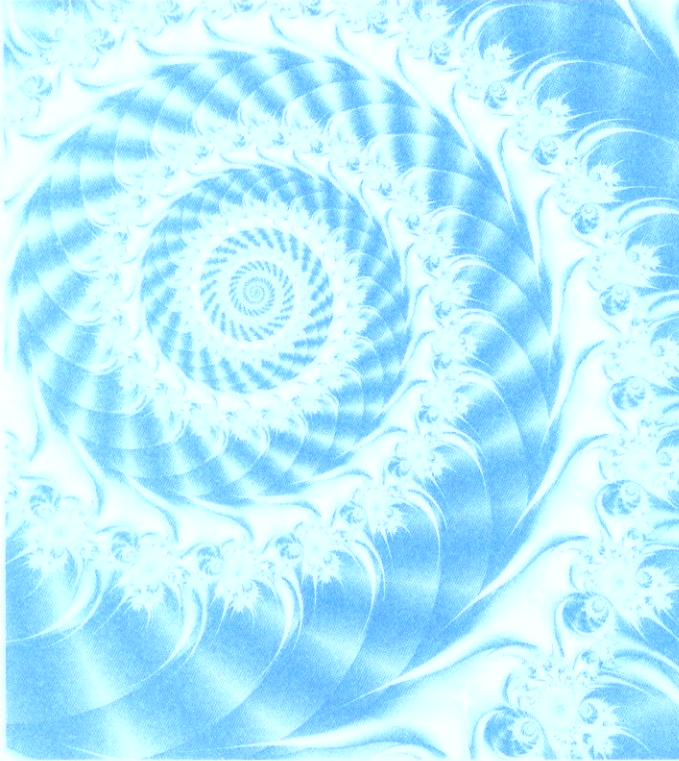


Polished Spiral Karin Kuhlmann



"Although the creation of fractals is bounded to strict mathematical rules, the results are always very inspiring." – Karin Kuhlmann

Investigations

IN NUMBER, DATA, AND SPACE®

Student Activity Book
Factors, Multiples, and Arrays
UNIT 1

Factors, Multiples, and Arrays

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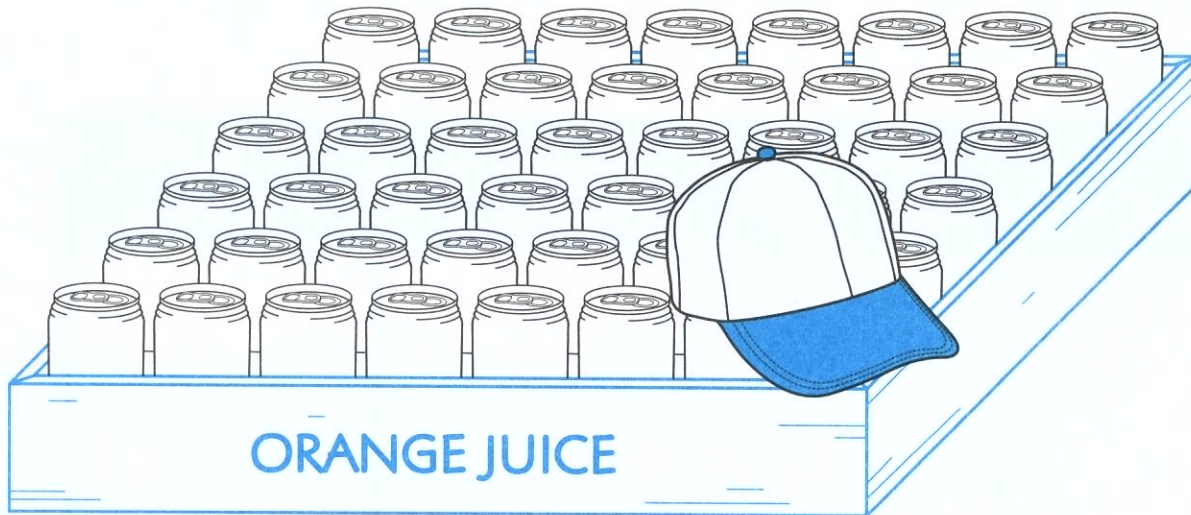
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How Many in This Array?



How many cans are in this case, including those under the cap? _____

How did you figure this out?

Things That Come in Arrays

Think of things that come in arrays. For each thing you think of, fill in all four columns of the chart.

What Is It?	How Many in the Array?	Dimensions	Drawing of the Array



Arrays All Around Us

NOTE Students identify the dimensions of rectangular arrays and find the total number in each.

SMH 16, 18

Item	Total	Dimensions	Array(s)
<p>1.</p>	16	2 by 8 8 by 2	
<p>2.</p>			
<p>3.</p>			
<p>4.</p>			

Ongoing Review

5. How many cups of yogurt are there?

- A.** 4 **B.** 6 **C.** 24 **D.** 36





More Things That Come in Arrays

Find things at home that come in arrays. For each thing you think of, fill in all four columns of the chart.

NOTE Students are learning about arrays (rectangular arrangements of rows and columns) to help them understand multiplication. Help your child find arrays at home, such as the panes of glass in a window or a six-pack of cans (2 rows of 3).

SMH 16, 18

What Is It?	How Many in the Array?	Dimensions	Drawing of the Array



Addition Starter Problems

Solve each problem in two different ways, using the first steps given. Show your work clearly.

NOTE Students practice strategies for addition. They work on efficiency and flexibility by solving the same problem in two different ways.

SMH 8–9

1. $254 + 763 =$ _____

a. Start by solving $200 + 700$.

b. Start by solving $250 + 750$.

2. $627 + 575 =$ _____

a. Start by solving $600 + 575$.

b. Start by solving $27 + 75$.

Ongoing Review

3. Find the missing number: 160, 260, 360, 460, _____

A. 860

B. 560

C. 500

D. 480

Looking at Our Arrays

As you walk around and look at our class arrays, answer the following questions:

1. Which numbers have only one array?



2. Which numbers have a square array?



3. Which numbers have the most arrays?



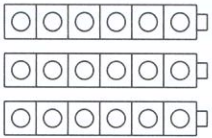
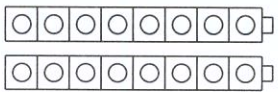
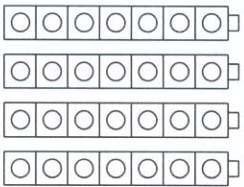
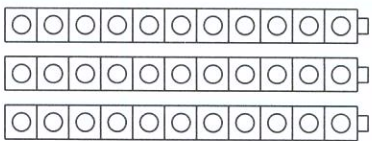
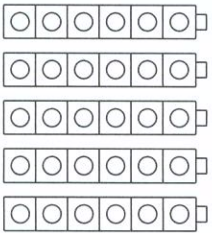
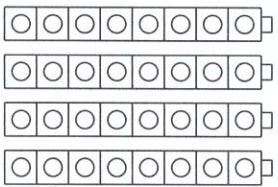


How Many Groups?

Complete the following.

NOTE Students practice multiplication as they look for equal-size groups in arrays.

SMH 16, 17, 18

<p>1. </p> <p>_____ groups of 6 make 18. _____ \times 6 = 18</p>	<p>2. </p> <p>_____ groups of 8 make 16. _____ \times 8 = 16</p>
<p>3. </p> <p>_____ groups of 7 make 28. _____ \times 7 = 28</p>	<p>4. </p> <p>_____ groups of 11 make 33. _____ \times 11 = 33</p>
<p>5. </p> <p>_____ groups of 6 make 30. _____ \times 6 = 30</p>	<p>6. </p> <p>_____ groups of 8 make 32. _____ \times 8 = 32</p>

Ongoing Review

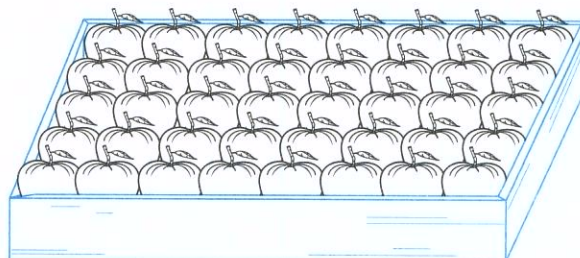
7. How many apples are in this crate?

A. 5

C. 20

B. 8

D. 40





Things That Come in Groups

Solve these story problems. Write a multiplication equation for each problem, and show how you solved it.

NOTE Students practice multiplication in the context of story problems.

SMH 16–17

A package of juice boxes has 8 juice boxes.

1. How many juice boxes are in 3 packages? _____

Equation: $3 \times 8 =$ _____

2. How many juice boxes are in 6 packages? _____

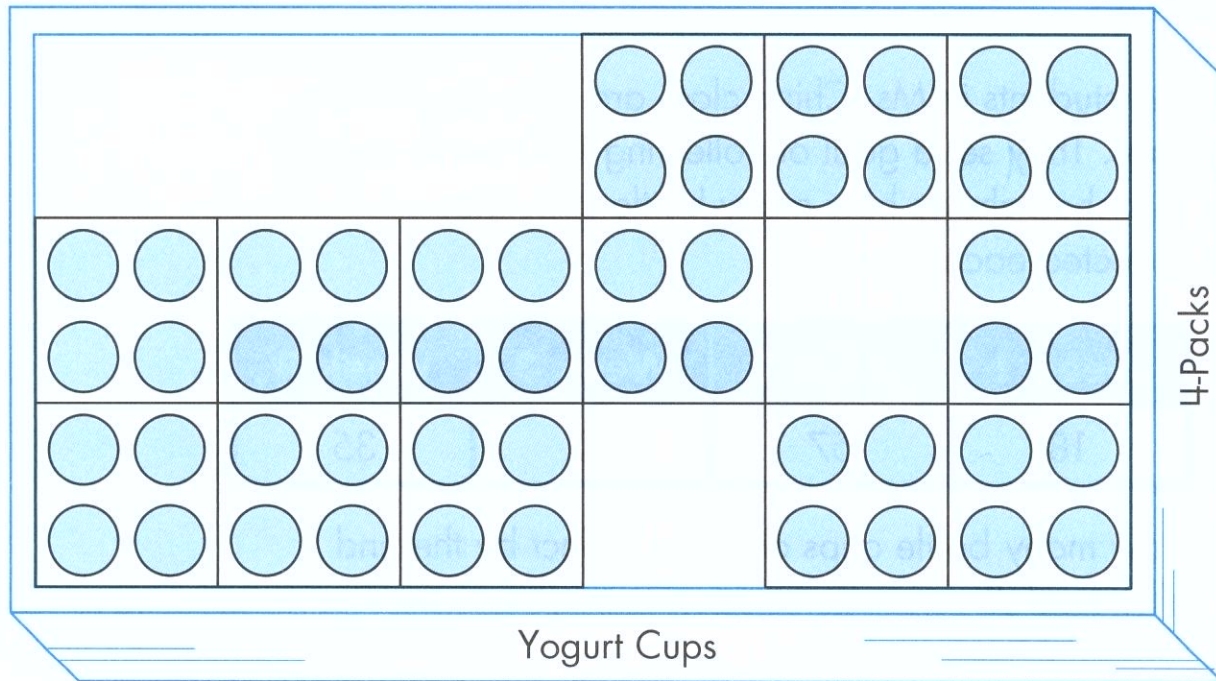
Equation: _____

3. How many juice boxes are in 9 packages? _____

Equation: _____

Another Array Picture

How many cups of yogurt were in this case when it was full?



_____ cups of yogurt

How did you figure this out?



Class Collections

Solve these problems. Be sure to write the equations that show how you got your answers.

NOTE Students practice addition in a story problem context.

SMH 8-9

1. a. The students in Ms. Chin's class are collecting bottle caps. They set a goal of collecting 400 bottle caps. This chart shows how many bottle caps they collected each week.

Week 1	Week 2	Week 3	Week 4
18	57	62	35

How many bottle caps did they collect by the end of 4 weeks?

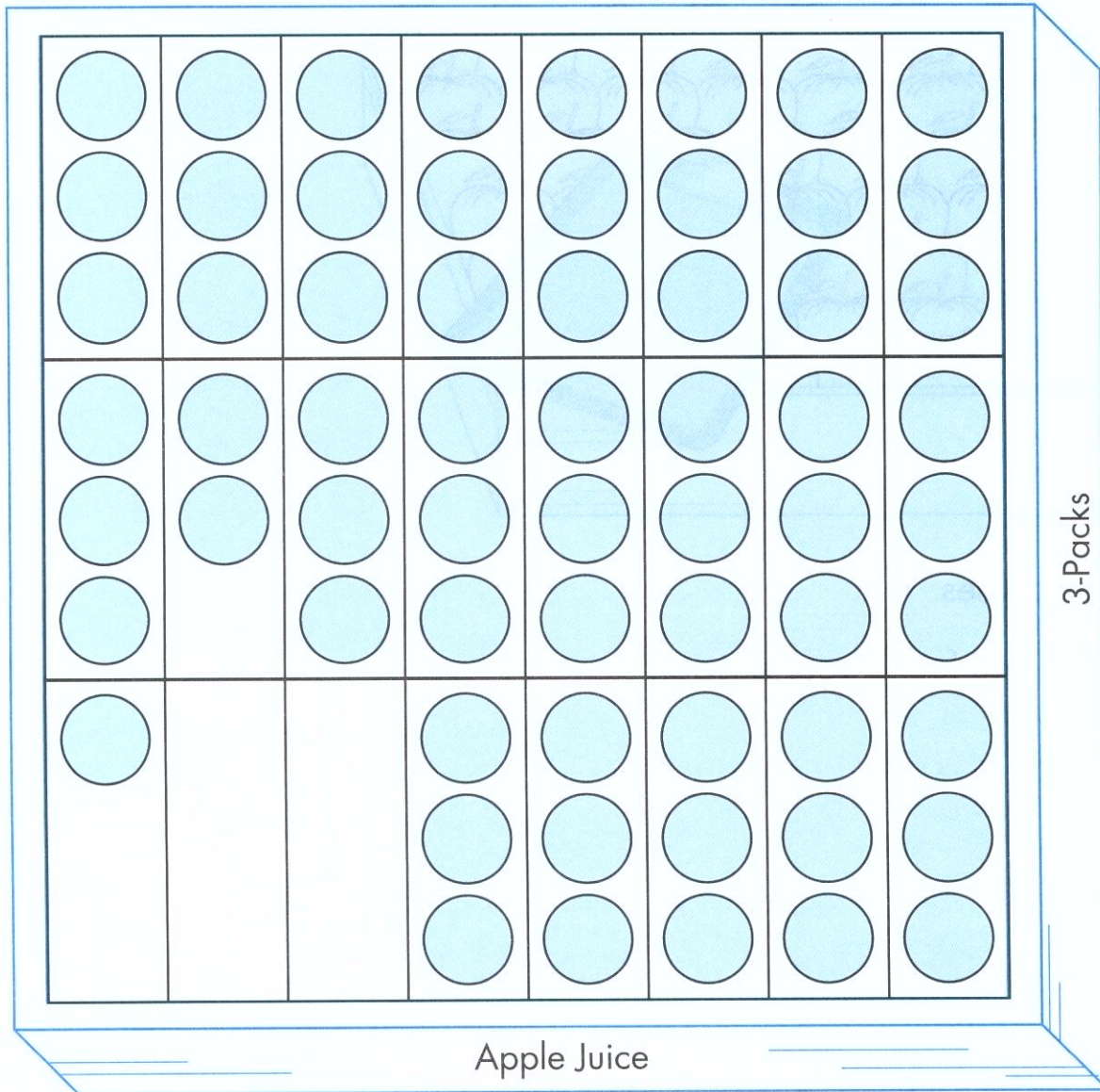
- b. How many more bottle caps do they need to collect to reach 400?
2. a. Mr. Ruiz's class wants to collect 500 rocks for a science project. Students have brought in these numbers of rocks: 65, 38 and 29. How many rocks have they collected so far?
- b. How many more rocks do they need to collect to reach 500?

Array Picture Problems (page 1 of 2)



Problem A

How many juice cans were in this case when it was full?



_____ juice cans

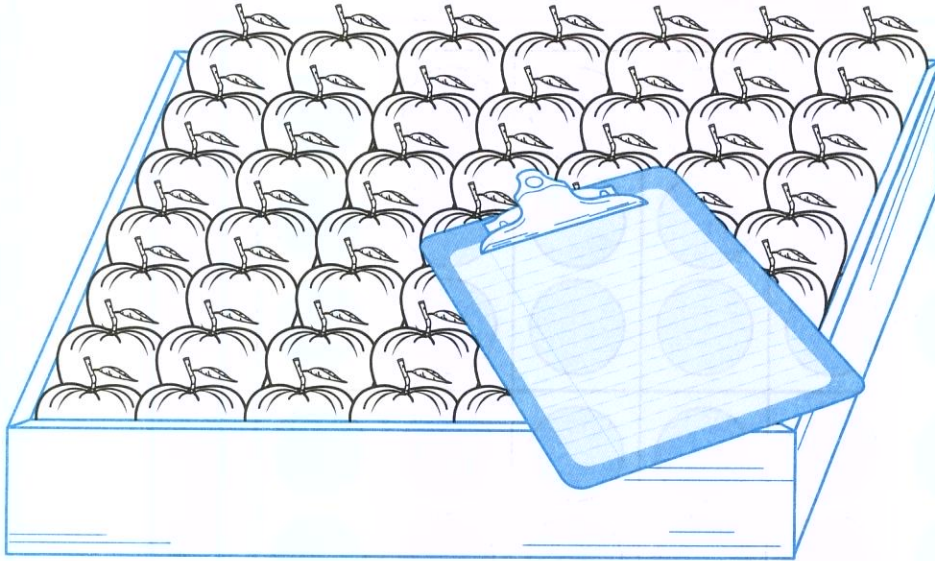
4 Explain how you found your answer.

Array Picture Problems (page 2 of 2)



Problem B

How many apples are in this case?



_____ apples

Explain how you found your answer.



Solve Two Ways

Solve this problem in two different ways. Be sure to record the equations and representations that show how you got your answer.

$$463 + 589 = \underline{\hspace{2cm}}$$

1. Here is the first way I solved it:

2. Here is the second way I solved it:

NOTE Students practice strategies for addition. They work on efficiency and flexibility by solving the same problem in two different ways.

SMH 8–9

Ongoing Review

3. What is the total cost of a pennant and a cap?

A. \$6.75

C. \$13.99

B. \$11.24

D. \$14.99

Souvenirs

Pennant	\$4.50
Cap	\$9.49
Ball	\$2.25



More Things That Come in Groups

Solve these story problems. Write a multiplication equation for each problem and show how you solved it.

A week has 7 days.

1. How many days are in 4 weeks? _____

Equation: _____

2. How many days are in 8 weeks? _____

Equation: _____

3. How many days are in 12 weeks? _____

Equation: _____

NOTE Students practice multiplication in a story problem context.

SMH 16–17



Collecting 1,000 Pennies

Solve these problems. Be sure to write the equations that show how you got your answers.

NOTE Students practice solving problems about the difference between three-digit numbers and 1,000.

The students in Ms. Shapiro's class want to collect 1,000 pennies in one month.

1. After the first week, they had collected 267 pennies.
How many more do they need to collect to reach 1,000?
2. After two weeks, they had collected a total of 516 pennies.
How many more do they now need to reach 1,000?
3. After 3 weeks, they had collected a total of 843 pennies.
How many more do they need to collect in the last week to reach 1,000?



Related Problem Sets

Solve the related problems in each set. As you work on these problems, think about how solving the first problem in each set may help you solve the others.

NOTE Students solve addition and subtraction problems in related sets.

SMH 8, 9, 13–15

<p>1. $\begin{array}{r} 500 \\ - 85 \\ \hline \end{array}$ $\begin{array}{r} 500 \\ -185 \\ \hline \end{array}$ $\begin{array}{r} 500 \\ -187 \\ \hline \end{array}$</p>	<p>2. $400 - 200 = \underline{\hspace{2cm}}$ $400 - 180 = \underline{\hspace{2cm}}$ $420 - 180 = \underline{\hspace{2cm}}$</p>
<p>3. $300 - 150 = \underline{\hspace{2cm}}$ $350 - 150 = \underline{\hspace{2cm}}$ $353 - 150 = \underline{\hspace{2cm}}$ $353 - 147 = \underline{\hspace{2cm}}$</p>	<p>4. $189 - 55 = \underline{\hspace{2cm}}$ $189 - 155 = \underline{\hspace{2cm}}$ $289 - 155 = \underline{\hspace{2cm}}$ $289 - 165 = \underline{\hspace{2cm}}$</p>
<p>5. $600 + \underline{\hspace{2cm}} = 1,000$ $650 + \underline{\hspace{2cm}} = 1,000$ $655 + \underline{\hspace{2cm}} = 1,000$ $658 + \underline{\hspace{2cm}} = 1,000$</p>	<p>6. $\begin{array}{r} 300 \\ 300 \\ +300 \\ \hline \end{array}$ $\begin{array}{r} 305 \\ 299 \\ +296 \\ \hline \end{array}$ $\begin{array}{r} 299 \\ 296 \\ +290 \\ \hline \end{array}$</p>

Ongoing Review

7. Which does **not** equal 404?

A. $199 + 205$

B. $201 + 203$

C. $198 + 202$

D. $202 + 202$



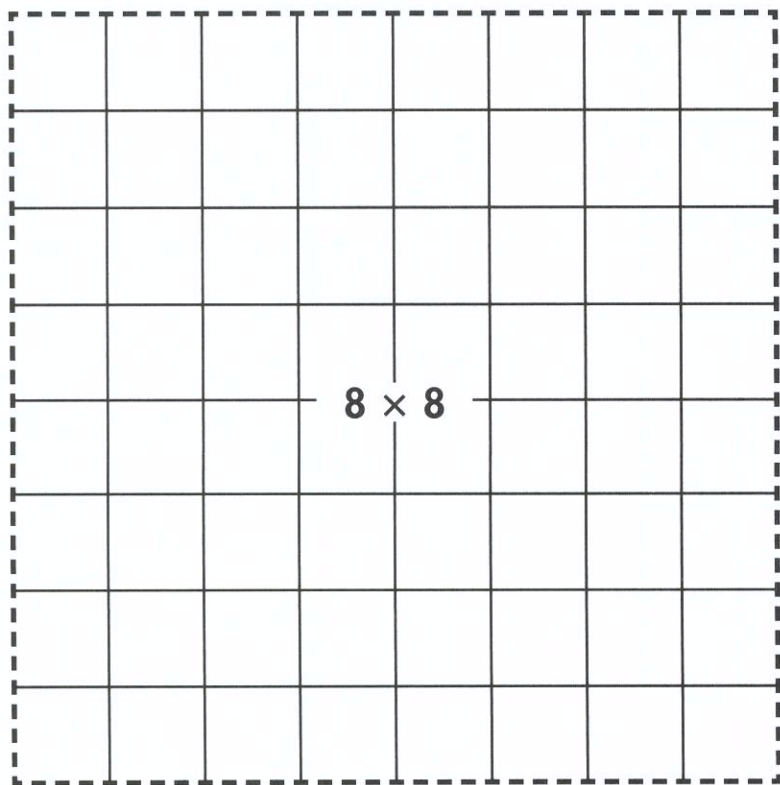
What's on the Other Side? (page 1 of 2)

For each of the two Array Cards shown, figure out the number of squares in the array. Explain how you solved each problem.

NOTE Students have been solving multiplication problems by using Array Cards. Here, students find the total number of units in the array and explain how they found it.

SMH 18-19

How did you solve 8×8 ?





Multiple Turn Over Recording Sheet

Write the numbers of your 10 Multiple Cards on the blank cards. As each factor is called, record it in the factor list. Then write which multiples of that number you have among your cards.

Game 1 Multiple Cards

--	--	--	--	--	--	--	--	--	--

Factor

Multiple Cards I Can Turn Over

1. _____

2. _____

3. _____

4. _____

5. _____

Game 2 Multiple Cards

--	--	--	--	--	--	--	--	--	--

Factor

Multiple Cards I Can Turn Over

1. _____

2. _____

3. _____

4. _____

5. _____



Distance Problems

NOTE Students practice addition in a story problem context, finding a combination of addends that equals a given sum.

1. **a.** Elena's family is taking a bicycle vacation over 4 days. They plan to bicycle 115 miles in all. Write an addition equation that shows one possible combination of miles they could bike over 4 days.

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = 115$$

- b.** Write another equation to show a second way they could bike a total of 115 miles.

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = 115$$

2. **a.** Edwin and his family are driving to a family reunion 516 miles away. They have 3 days to drive the total distance. Write an addition equation that shows one possible combination of miles they could drive over 3 days.

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = 516$$

- b.** Write another equation to show a second way they could drive a total of 516 miles.

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = 516$$

Ongoing Review

3. $124 + 127 + 125 = \underline{\hspace{2cm}}$

- A.** 376 **B.** 375 **C.** 372 **D.** 366



Practicing with Multiplication Cards (page 1 of 2)

NOTE Students are learning the multiplication combinations (or “facts”) up to 12×12 . Help your child practice these.

SMH 29–34

1. Look at the front of each Multiplication Card. If you have a helper, that person can show you one card at a time.
2. Your job is to say the answer to the problem as quickly as you can. If you get the answer right away, put the card in a pile of combinations that you “just know.” If you have to stop and figure it out, put it into a different pile of combinations that you are still “working on.”
3. Paper-clip your “just know” cards together, and set them aside.
4. Look at each card in your “working on” pile. Think of an easy multiplication combination, one that you already know, that can help you remember each one. Write it on the line that says “Start with _____.”
Example: “For 6×7 , I know that $7 \times 7 = 49$, so it must be one 7 less—that’s 42.”
5. Go through each of the cards in your “working on” pile at least 3 times, using your “start with” combinations to help you find the answers.
6. Put all of your cards back together, both “just know” and “working on,” and go through them again.
7. Over the next few weeks, keep practicing until you have no more cards in your “working on” pile. Practice at school when you have extra time, and practice at home with a family member.

6×7
7×6
Start with 7×7



Practicing with Multiplication Cards (page 2 of 2)

1. Which multiplication combinations are you practicing?

_____	_____
_____	_____
_____	_____
_____	_____

2. Write two multiplication combinations that are hard for you, and explain what helps you remember them.

Multiplication combination: _____

What helps me:

Multiplication combination: _____

What helps me:

3. How did you practice your multiplication combinations?
Who helped you?



Money Problems

Solve these problems. Show clearly how you solved each one.

NOTE Students practice addition and subtraction in the context of money.

SMH 8, 9, 13, 14, 15

1. $\$6.57 + \$4.98 = \underline{\hspace{2cm}}$

2. $\$7.34 + \$2.78 = \underline{\hspace{2cm}}$

3. $\$8.60 - \$3.95 = \underline{\hspace{2cm}}$

4. $\$7.30 - \$4.75 = \underline{\hspace{2cm}}$

Ongoing Review

5. One pen costs \$1.55. What is the total cost of 3 pens?

- A.** \$3.65 **B.** \$4.55 **C.** \$4.65 **D.** \$5.55



More Practice with Multiplication Cards

NOTE Students are learning the multiplication combinations (multiplication “facts”) to 12×12 . Continue helping your child with this practice.

SMH 29–34

1. Which multiplication combinations are you practicing?

2. Write two multiplication combinations that are hard for you, and explain what helps you remember them.

Multiplication combination: _____

What helps me:

Multiplication combination: _____

What helps me:

3. How did you practice your multiplication combinations?
Who helped you?



Picnic Supplies

Solve these problems. Be sure to write the equations that show how you got your answers.

NOTE Students solve addition and subtraction problems in a story problem context.

SMH 8–9, 13–15

1. The Cottonwood School is having a school picnic. The school brought 400 bottles of juice, and students drank 318 of them at the picnic. How many bottles of juice were left over?
2. There are 143 plates left over from last year's picnic, and the principal wants a total of 500 plates. How many more plates does the principal need?
3. The school provides 117 apples, 241 oranges, 86 bananas, and 43 pears. How many pieces of fruit are there in all?
4. This year 463 people came to the picnic. Last year, because of cold weather, only 227 came. How many more people came to this year's picnic?



Factors and Products

Fill in the chart with the missing factors or products.

NOTE Students are working to become fluent with multiplication combinations (also called multiplication “facts”). Here, they practice multiplication combinations by finding products or missing factors.

SMH 26, 29–34

Factor	×	Factor	=	Product
	×	8	=	16
4	×	7	=	
6	×		=	24
	×	5	=	30
3	×	9	=	
7	×		=	49
8	×	6	=	
10	×		=	100
	×	4	=	36

Finding the Factors of 100

Find the factors of 100. You may use the 100 chart, cubes, arrays, grid paper, or drawings to help you make sure that the numbers you choose are factors. Record the factors in the chart.

Factor	How Many in 100?	Factor Pair
Example: 1	100	100×1

When you think you have found all of the factors of 100, list them here.

Finding the Factors of 300

Find the factors of 300. Record the factors in the chart. You can use multiplication combinations you know to help you. You can also use the 300 chart, cubes, arrays, grid paper, or drawings to find the factors.

Factor	How Many in 300?	Factor Pair	Factor	How Many in 300?	Factor Pair

When you think you have found all of the factors of 300, list them here.



How Many More?

Solve these problems. Show your solutions on the number lines provided.

NOTE Students find the missing number to make a correct addition equation.

1. $621 + \underline{\hspace{2cm}} = 950$



2. $481 + \underline{\hspace{2cm}} = 895$



3. $508 + \underline{\hspace{2cm}} = 780$



4. $437 + \underline{\hspace{2cm}} = 1,100$





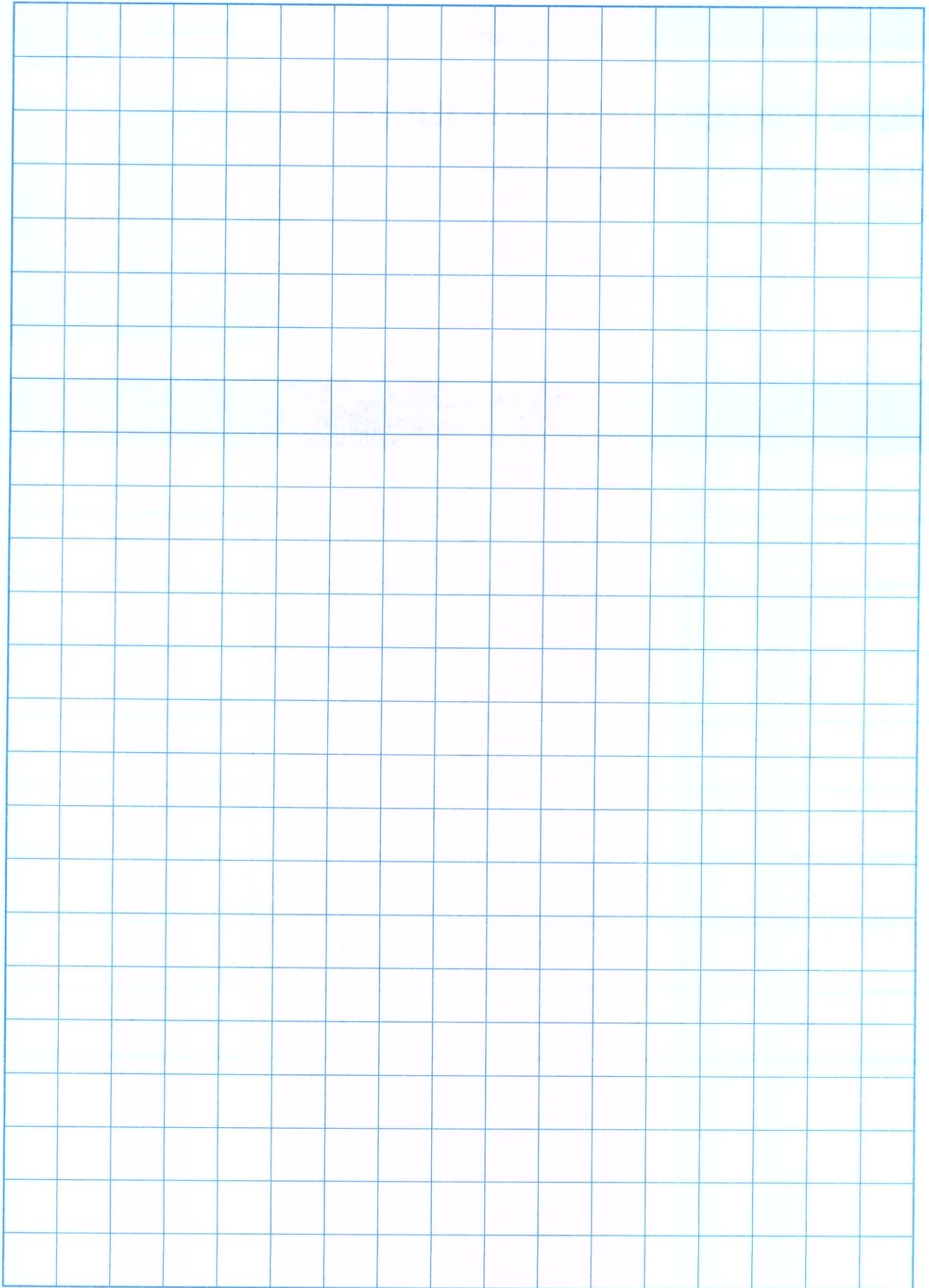
More Factors and Products

Fill in the chart with the missing factors or products.

NOTE Students are working to become fluent with multiplication combinations (also called multiplication “facts”). Here, they solve problems to find a factor or products in some of the more difficult combinations.

SMH 26, 29–34

Factor	×	Factor	=	Product
10	×	9	=	
	×	7	=	77
12	×	8	=	
9	×		=	63
8	×	9	=	
	×	6	=	42
5	×	8	=	
6	×		=	48
4	×		=	36





Story Problems

Solve these problems. Show how you got your answers.

NOTE Students solve multistep addition and subtraction problems in a story problem context.

SMH 8–9, 13–15

1. Marisa had 574 stamps in her stamp collection. She gave 255 stamps to her brother to start his own collection. Then Marisa's aunt gave her 449 stamps. How many stamps does Marisa have in her collection now?
2. Ms. Gomez is running for the city council. She printed 1,000 campaign brochures for the elections. On the first day, she gave away 387 brochures. On the second day, she gave away 515 brochures. How many brochures does she have left?
3.
 - a. Devon earned \$13.50 for babysitting his niece. He also earned \$4.50 for doing his chores that week. He wants to buy a backpack that costs \$18.45. Does he have enough money?
 - b. If he does not have enough money, how much more does he need?



Factors of Multiples of 100 (page 1 of 2)

Fill in each chart on these two pages. Tell how many of the given factor it takes to get to each multiple of 100. Then write the factor pair. Look at the first two charts for examples. Use multiplication combinations you know, or use math tools, such as the 300 chart, to help you.

NOTE Students are working on finding factors of 100, 200, 300, and other multiples of 100. Here, they find ways to multiply to make these numbers.

SMH 26

Factor	How Many?	Multiple	Factor Pair	Factor	How Many?	Multiple	Factor Pair
2	50	100	2×50	5	20	100	5×20
2		200		5		200	
2		300		5		300	
2		400		5		400	
2		500		5		500	
2		600		5		600	



Factors of Multiples of 100 (page 2 of 2)

Continue filling in these charts. Remember, you can use multiplication combinations you know or math tools, such as the 300 chart, to help you.

Factor	How Many?	Multiple	Factor Pair	Factor	How Many?	Multiple	Factor Pair
10		100		20		100	
10		200		20		200	
10		300		20		300	
10		400		20		400	
10		500		20		500	
10		600		20		600	

Factor	How Many?	Multiple	Factor Pair	Factor	How Many?	Multiple	Factor Pair
25	4	100	25×4	4	25	100	4×25
25		200		4		200	
25		300		4		300	
25		400		4		400	
25		500		4		500	
25		600		4		600	



How Many People Counted?

Read the problems, and answer the questions. Try to solve the problems without actually doing the skip counting yourself. What do you know that will help you?

NOTE Students have been finding the multiples of given numbers in a routine called Counting Around the Class (for example, 20, 40, 60, 80, . . .). Here, they practice finding a series of multiples of a number.

SMH 24, 25

1. Ms. McCoy's class counted by 20s. How many people counted to get to 300? How do you know?
2. Mr. Harris's class counted by 10s. How many people counted to get to 300? How do you know?
3. Ms. Gomez's class counted by 25s. How many people counted to get to 300? How do you know?

Factors of 16 and 48 (page 1 of 2)

1. Find the factors of 16 and the factors of 48. Use arrays, pictures, or cubes to show your thinking.

Factors of 16:

Factors of 48:

Factors of 16 and 48 (page 2 of 2)



2. Explain why all of the factors of 16 are also factors of 48. Use arrays, pictures, or cubes to help you make your argument.

3. 32 and 64 are multiples of 16.

$$2 \times 16 = 32$$

$$4 \times 16 = 64$$

Choose one of the factors of 16, and find out whether it is also a factor of 32 and 64. Do you think all of the factors of 16 are also factors of the multiples of 32 and 64? Are the factors of 16 also factors of other multiples of 16? Explain your thinking.



Combinations to 100 and 200



NOTE Students use number sense and place-value knowledge to solve addition problems.

1.

4

9

2

7

6

3

--

--

 +

--

--

 = _____

Use this set of digits to write an equation that will be as close to 100 as possible. Use 2-digit numbers in your equation. Explain why this is as close to 100 as you can get with this set of digits.

2.

4

9

2

7

6

3

5

1

--

--

 +

--

--

 +

--

--

 = _____

Use this set of digits to write an equation that will be as close to 200 as possible. Use three 2-digit numbers in your equation. Explain why this is as close to 200 as you can get with this set of digits.



Multiplying by Factors of 100

Solve each set of problems. Look for patterns that might help you.

NOTE Students have been finding factors of 100, 200, and 300. Here, they solve multiplication problems that involve these factors.

SMH 37, 38

1. $2 \times 50 = \underline{\hspace{2cm}}$

$4 \times 50 = \underline{\hspace{2cm}}$

$6 \times 50 = \underline{\hspace{2cm}}$

2. $4 \times 25 = \underline{\hspace{2cm}}$

$6 \times 25 = \underline{\hspace{2cm}}$

$8 \times 25 = \underline{\hspace{2cm}}$

3. $\underline{\hspace{2cm}} \times 4 = 100$

$\underline{\hspace{2cm}} \times 4 = 200$

$\underline{\hspace{2cm}} \times 4 = 300$

4. $10 \times \underline{\hspace{2cm}} = 200$

$10 \times \underline{\hspace{2cm}} = 300$

$10 \times \underline{\hspace{2cm}} = 400$

5. $5 \times 20 = \underline{\hspace{2cm}}$

$10 \times 20 = \underline{\hspace{2cm}}$

$15 \times 20 = \underline{\hspace{2cm}}$

6. $\underline{\hspace{2cm}} \times 5 = 100$

$\underline{\hspace{2cm}} \times 5 = 200$

$\underline{\hspace{2cm}} \times 5 = 400$



Rock On!

Solve each problem. Draw the arrays and write equations. Use another sheet of paper if you need to.

NOTE Students solve real-world problems involving the math content of this unit.

SMH 18–21

1. Rock bands often stack their speakers in an array. One teen band has 24 speakers. They stack them at least 2 high, but no taller than 8 high. What are all the different arrays they can make?
2. One band has 30 speakers. They stack them at least 3 high, but no taller than 6 high. What are all the different arrays they could make?
3. Another band has 48 speakers. They stack them at least 4 high, but no taller than 6 high. What are all the different arrays they can make?
4. One band has fewer than 40 speakers. They stack them in an array exactly 9 high. How many speakers could they have? Explain how you know.

