







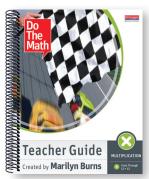


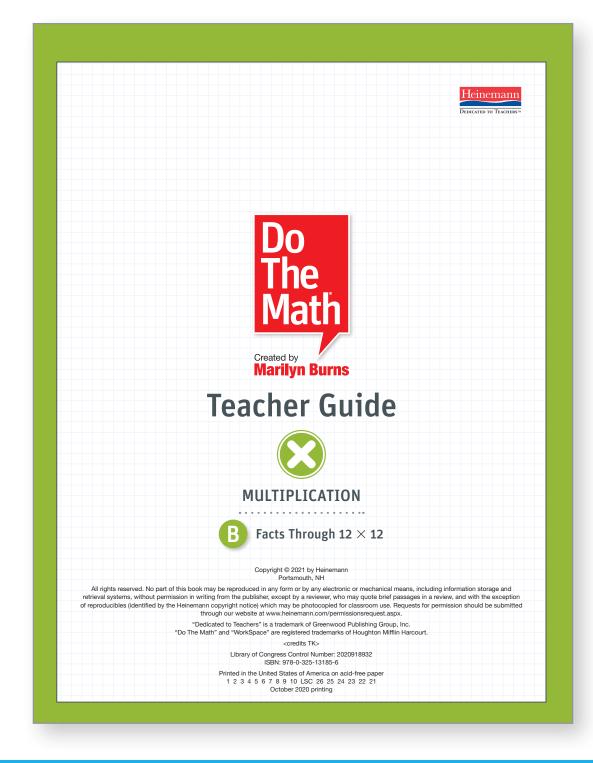
DO THE MATH TEACHER GUIDE SAMPLER

MULTIPLICATION

This Sampler includes select pages from the Multiplication Teacher Guide. You'll see a sample of the:

- Section Overview
- Instructional Principals
- Letter from Marilyn Burns
- Planner
- Lessons
- Annotated WorkSpace
- Show What You Know, Objectives Tracker, Community News

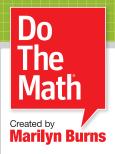




To see additional Do The Math samplers, please visit http://hein.pub/DoTheMathSamplers

To access the eSampler, please visit Heinemann.com/DoTheMath.

heinemann.com/dothemath



Overview

➤ Introduction to Do The Math

An Introduction	From Marilyn Burnsi
Instructional Pri	nciplesv
Multiplication 🥼	Materials
Multiplication ᠖	at a Glancexi
Table of Content	

> The Lessons

LESSONS 1-5

PAGE

Understand the Multiplication Chart

Students strengthen their understanding of multiplication as they relate the number of squares in rectangles to products on the Multiplication Chart.



LESSONS 6-10

PAGE

Understand the Multiplication Chart

Students recreate the *Multiplication* Chart through hands-on experiences with rectangles and rectangle splitting.



LESSONS 11-15

PAGE

Identify Patterns on the Multiplication Chart

Students develop increased familiarity with products on the Multiplication Chart by exploring the visual patterns of multiples. The game Pathways provides practice for multiplying with factors 3 through 8.



LESSONS 16-20

PAGE

Learn About Square Numbers

Bats on Parade provides a context for learning about square numbers and exploring the pattern of square numbers on the Multiplication Chart. Silent Multiplication focuses students' attention on the pattern of products when one factor is 10.



LESSONS 21-25

PAGE

Practice Multiplication Facts

Students focus on the basic multiplication facts, playing a game and re-experiencing Silent Multiplication as they determine the products they know and practice the products they need to learn.



LESSONS 26-30

PAGE

Practice Multiplication

Students review what they've experienced during the lessons and contribute to the creation of a concept web. They progress from the geometric strategy of rectangle splitting to a related strategy of number splitting to find products.

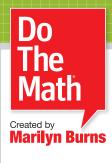


> Additional Resources

Attitude Survey	141
Objectives Tracker	142
Do The Math Community News	143
Teacher Glossary	149
Index	154











Instructional Principles

Help At-Risk and Struggling Students Succeed in Math

Research shows that students with diverse needs succeed in learning mathematics through explicit, intentional teaching based on proven instructional strategies.

TEACHING FOR UNDERSTANDING

Students benefit from instruction based on teaching for understanding.

Step-by-step lessons help students develop understanding, learn mathematical skills, see relationships, and make connections.

- Learning experiences link concepts and skills to their mathematical representations and language.
- Students use concrete and pictorial models to build a strong foundation in key mathematical concepts, operations, and strategies.

SCAFFOLDED CONTENT

Scaffolding of the content makes the mathematics more accessible to students.

Do The Math focuses on key content in mathematics so that students are not overwhelmed with extraneous material.

- The content is organized into manageable chunks.
- The lessons are explicit about the relationships among these chunks.
- The instruction is carefully sequenced to help students build a solid foundation of understanding.

MULTIPLE STRATEGIES

Exploring different strategies for developing concepts and skills builds students' reasoning.

The lessons engage students with each concept and skill in several ways, deepening their mathematics knowledge.

- Hands-on manipulatives give students concrete experiences with abstract ideas.
- The **digital mTools** give students the opportunity to translate concrete manipulatives to pictorial representations.
- Classroom and digital partner games offer engaging experiences that reinforce mathematical understandings and skills.
- Children's literature provides a springboard for instruction.
- Contexts make abstract mathematical ideas accessible.

MATHEMATICAL THINKING

These standards help develop mathematical expertise and habits of mind in all students.

- Students persevere and solve problems and look for entry points to solutions.
- Students reason abstractly to make sense of quantities and their relationships in problem situations.
- Students use stated assumptions, definitions, and previously established results to construct viable arguments.
- Students model with mathematics to solve real-world and mathematical problems.
- Students apply mathematical and practical tools strategically when solving problems.
- Students attend to precision, using mathematical language to communicate clearly and accurately.
- Students look closely to discern patterns or structure when solving problems.
- Students use repeated reasoning to identify general methods and shortcuts.

MULTIPLICATION MODELS



Grid Charts are used to apply the distributive property of multiplication by splitting rectangles.



Tiles represent multiplication with arrays.



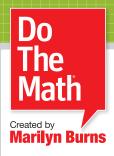
Multiplication Charts help students to find the product of two factors.



are used to identify random digits in multiplication games.



Egg cartons demonstrate multiplying by 12.







Instructional Principles (continued)

Help Students Build Their Mathematical Reasoning

CLASSROOM ROUTINES

Routines such as "think, pair, share" promote engagement and deepen student understanding.

THINK

Students collect their thoughts individually.

PAIR

Students discuss with a partner.

SHARE

Students report ideas to the whole group.

Expressing ideas and hearing other perspectives help students clarify their thinking.

- The listening and speaking that occur during "think, pair, share" are especially valuable for English language learners.
- Teachers can pair English language learners with other students who speak the same first language to allow them to discuss concepts.
- Teachers can also pair a student with early English skills and a student with strong English skills to encourage language development.

INDEPENDENT STUDENT WORK

Assignments provide students with opportunities to practice, strengthen, and extend their learning.

- WorkSpace® assignments are carefully constructed to motivate students and maximize their success through games, assignments for reinforcement, and problem-solving situations.
- The digital experience gives students the flexibility to explore mathematical tools and games within and outside the classroom.

The second of th

VOCABULARY AND LANGUAGE

Explicit vocabulary instruction helps students communicate effectively about the math they are learning.

Vocabulary is introduced after students experience concepts. Vocabulary lessons follow a consistent routine—the teacher writes the vocabulary on the *Math Vocabulary* chart and provides an example; students see, hear, say, and write it; the vocabulary is then incorporated throughout the lessons to support students' learning.

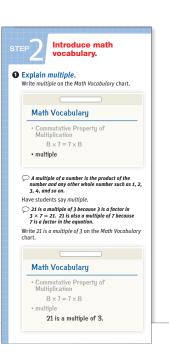
- Key mathematical and academic vocabulary is highlighted at the start of each lesson, and Spanish translations are provided.
- A glossary in the WorkSpace® provides students with a reference for definitions.

ASSESSMENT AND DIFFERENTIATION

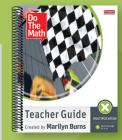
Ongoing assessment is built into the program to help teachers meet individual student needs.

During lessons, teachers observe students working in the whole group, with partners, and independently.

- Specific guidance for how to promote understanding and address student misconceptions is integrated into all lessons.
- Suggestions for differentiating instruction are included after every "Assessing Student Understanding" lesson, both for students who need additional help and those who are ready for a challenge.







FROM MARILYN BURNS



In Lessons 1–5, students...

· Calculate products with factors 0 through 12.

Represent arrangements

multiplication equations.

· Communicate ideas with key math vocabulary:

multiplication equation,

factor, and product.

• Use the Commutative Property of Multiplication to

of equal rows and

rectangles with

solve problems.

Dear Colleague,

The Multiplication Chart is a mathematical icon in the elementary grades, and learning the multiplication facts is both a rite of passage for students and a gatekeeper for their continued success. Students typically are introduced to the Multiplication Chart early in their study of multiplication. While they learn early on how to use the chart to find the products of factors through 12, most have not learned how the Multiplication Chart was created. Also, for many, their understanding of what multiplication means is fragile, thus making the Multiplication Chart all the more mysterious.

In these lessons, students first focus on the meaning of multiplication by connecting arrangements of tiles in equal rows to multiplication equations.



 $4 \times 5 = 20$

Students practice finding the total number of tiles arranged in equal rows and writing multiplication equations to represent them with the game Tiles Capture.



Students review the vocabulary factor and product and how to use the *Multiplication Chart* to check their answers. Also, they learn to record the arrangements of equal rows of tiles on grid paper, which results in drawing rectangles.

	_						
X	1	2	3	4	5	6	7
1	1 1		3	4	5	6	7
2	2	4	6	8	10	12	14
3	3	6	9	12	15	18	21
4	4	8	12	16	20	24	28
5	5	10	15	20	25	30	35
							30

These experiences prepare students for exploring patterns on the Multiplication Chart and learning to relate the number of squares in rectangles to products on the chart.

Marly Mon

Lessons 1–5

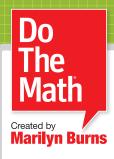
Learning the multiplication facts is both a rite of passage for students and a

gatekeeper for their

continued success.



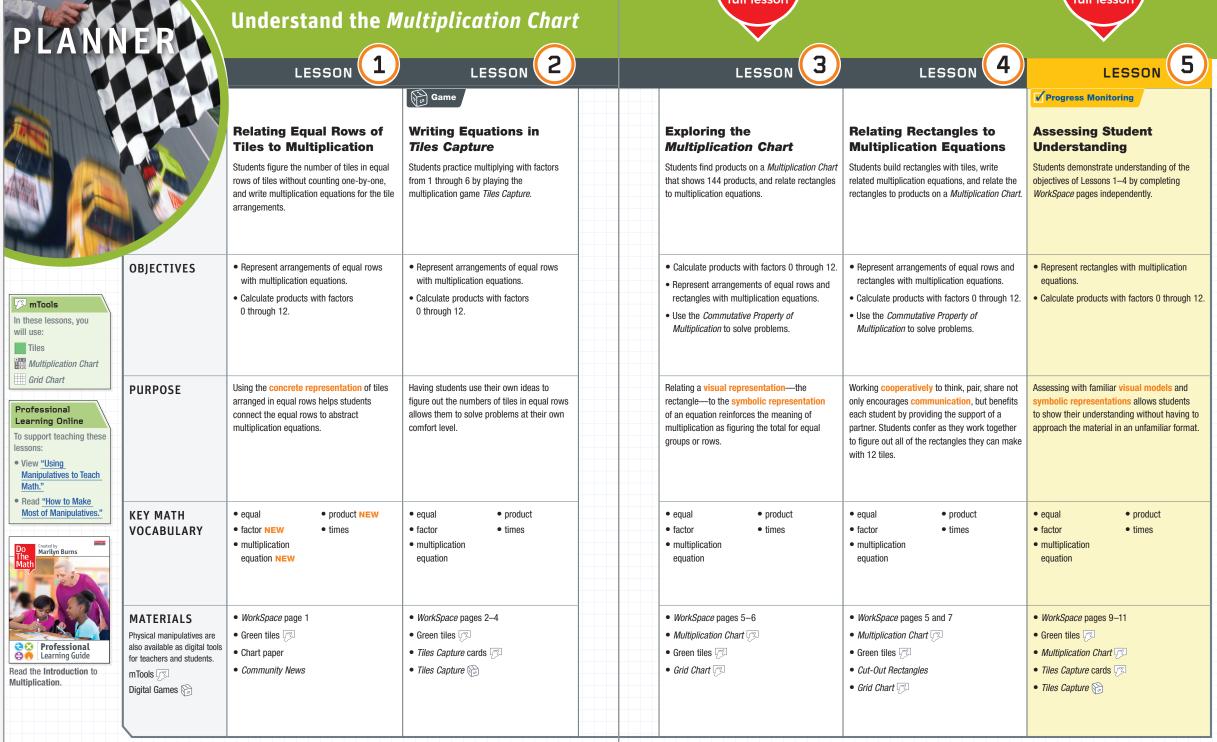
Understand the *Multiplication Chart*



4 Understand the Multiplication Chart











Planner 5







LESSON (3) Exploring the Multiplication Chart

Last Lesson Students practice multiplying factors from 1 through 6 by playing a game.

Lesson (3) Students find products on a Multiplication Chart and relate rectangles to multiplication equations.

Next Lesson Students build rectangles, write related multiplication equations, and relate the rectangles to products on a *Multiplication Chart*.

Summary

Students find products on a Multiplication Chart that shows 144 products, and relate rectangles to multiplication equations.

Objectives

- Calculate products with factors 0 through 12.
- · Represent arrangements of equal rows and rectangles with multiplication equations.
- Use the Commutative Property of Multiplication to solve problems.

Materials

- WorkSpace pages 5-6
- Multiplication Chart
 Martiplication Chart
 Multiplication Chart
 Multiplicatio
- Green tiles 💯

Language Development

Key Math Vocabulary

ENGLISH	SPANISH
equal	igual
factor	factor
multiplication equation	ecuación de multiplicación
product	producto
times	por

Academic Vocabulary

ENGLISH	SPANISH
row	fila
group	grupo
On amountain and all account in	italiaa, maintina aut tha ainsi

Cognates are shown in italics; pointing out the similarity of these words to their English equivalents will help your Spanish-speaking students acquire math vocabulary.

WHOLE GROUP

STEP

Students explore the Multiplication Chart.

1 Introduce the lesson.

Display the Multiplication Chart.

X												
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Today, we'll look at the Multiplication Chart and use it to find products. Then we'll see how rectangles can help with

2 Demonstrate how to find the product of two factors.

Write $4 \times 3 =$ on the board.

Show how to find the product by placing your left finger on the 4 in the far left column and your right finger on the 3 in the top row. Then move your left finger across from the 4 and your right finger down from the 3 until they meet at 12.

X	1	2	3	4	5	6	7
1	1	2	3	4	5	6	7
2	2	4	6	8	10	12	14
3	3	6	9	12	15	18	21
4	4	8 (12	16	20	24	28
5	5	10	15	20	25	30	35

Tell students that 12 is the product of the factors 4 and 3. Complete the equation on the board: $4 \times 3 = 12$.

3 Guide students to use the chart to find a product.

Write $4 \times 5 =$ on the board. Tell students that they will use the Multiplication Chart on WorkSpace page 5 to find the product.

Start by putting your left finger on the 4 in the far left column and your right finger on the 5 in the

Model this on the class chart and then check that students have positioned their fingers correctly.

Now, move your left finger across from 4 and your right finger down from 5. The product is where your fingers meet. Let's say the product together. What is the product of 4 times 5? (20)

Complete the equation on the board: $4 \times 5 = 20$.

$$4 \times 5 = 20$$

X	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
2	2	4	6	8	10	12	14
	3	6	9	12	15	18	21
4	4	8	12	16 (20	24	28
	5	10	15	20	25	30	35

WHOLE GROUP

Students use the **Multiplication Chart.**

• Write problems on the board.

$$4 \times 5 = 20$$
 $5 \times 2 =$
 $6 \times 3 =$ $5 \times 5 =$
 $3 \times 6 =$ $6 \times 6 =$
 $2 \times 5 =$ $4 \times 6 =$

2 Students locate products.

Have students locate the product for each problem on their Multiplication Charts on WorkSpace page 5.



Then choose one student at a time to go to the posted Multiplication Chart and locate the product for one problem. Record the products on the hoard.

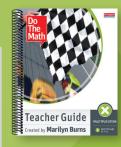
$$4 \times 5 = 20$$
 $5 \times 2 = 10$
 $6 \times 3 = 18$ $5 \times 5 = 25$
 $3 \times 6 = 18$ $6 \times 6 = 36$
 $2 \times 5 = 10$ $4 \times 6 = 24$

CONTINUE

Lesson 3 15







LESSON (3) Exploring the Multiplication Chart

WHOLE GROUP

Build a rectangle for 2×6 .

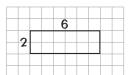
1 Demonstrate how to build a rectangle to show 2×6 .

Arrange 6 tiles in a row. Use 6 more tiles to form another row directly beneath the first row.



 \bigcirc This is a lot like the tile arrangements we made before, but this time I have pushed the tiles together so the tiles form a rectangle.

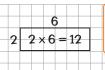
Outline the same rectangle on the Grid Chart.



2 Write a multiplication equation for the 2×6 rectangle.

 \bigcirc There are 2 rows with 6 tiles in each row. We can write a multiplication equation for the rectangle.

Write $2 \times 6 = 12$ inside the rectangle on the Grid Chart.



Illustrations of the Grid Chart will only show enough of the chart for your demonstrations.

Point to the parts of the equation as you read it two different ways.

2 rows of 6 tiles equals 12 tiles.

2 times 6 equals 12.

16 Understand the Multiplication Chart

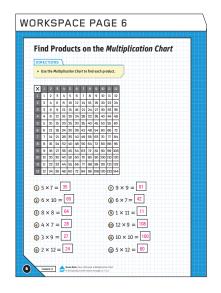
INDIVIDUALS



Students use a **Multiplication Chart** to find products.

1 Students complete *WorkSpace* page 6.

Explain the directions to the WorkSpace page and have students complete the page independently.



2 Partners compare answers.

Have partners check each other's answers and resolve any differences by rechecking the Multiplication Chart.

When you release students to work independently on WorkSpace assignments, it is beneficial for them to have the support of a partner. These assignments are part of their process of learning.

Students may talk about a problem first, or tackle it on their own and then compare and share. In either case, each student should record individually, even if working with a partner.

WHOLE GROUP

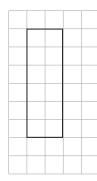
Build a rectangle for 6×2 .

 Demonstrate how to build a rectangle to show 6×2 .

Repeat the procedure for a 6×2 rectangle. Arrange 2 tiles in a row. Continue making rows of 2 tiles each until you have built a rectangle with 6 rows.



Then outline the arrangement on the *Grid Chart*, pointing with a finger to show each row.



◯ How many rows are in this rectangle? (6)

Write 6 to the left of the rectangle. ○ How many tiles are in each row? (2)

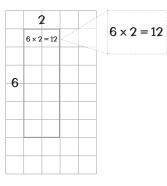
Write 2 above the rectangle.

○ How many tiles are there altogether? (12)

2 Write a multiplication equation for the rectangle.

There are 6 rows with 2 tiles in each row. There are 6 equal groups, with 2 in each group. We can write a multiplication equation for this rectangle.

Write $6 \times 2 = 12$ inside the rectangle on the board.



Point to the parts of the equation as you read it two different ways.

2 rows of 6 tiles equals 12 tiles. 2 times 6 equals 12.

STOP

Lesson 3 17







LESSON (5) Assessing Student Understanding

Last Lesson Students build rectangles, write related multiplication equations, and relate rectangles to products on a

Lesson (5) Students demonstrate understanding of the objectives of Lessons 1-4.

Next Lesson Students use rectangles to record products on a Missing Products Chart.

Summary

Students demonstrate understanding of the objectives of Lessons 1-4 by completing WorkSpace pages independently.

Objectives

- Represent rectangles with multiplication
- Calculate products with factors 0 through 12.

Materials

- WorkSpace pages 9-11
- Green tiles
- Multiplication Chart
 Multiplicatio
- Tiles Capture cards
- Tiles Capture 😭

Language Development

Key Math Vocabulary

ENGLISH SPANISH equal igual factor factor multiplication equation ecuación de multiplicación product producto

times por

Cognates are shown in italics; pointing out the similarity of these words to their English equivalents will help your Spanish-speaking students acquire math vocabulary.

INDIVIDUALS

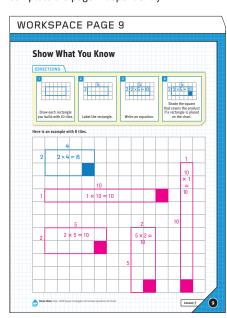
STEP

Students complete assessment.

1 Introduce the lesson.

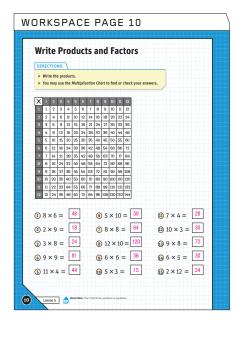
- ☐ Today, you'll show me how much you know about writing multiplication equations for rectangles. Then you'll solve some problems using your Multiplication Chart.
- 2 Individuals complete *WorkSpace* page 9.

Have students each take 10 tiles from their kits. Explain the directions for WorkSpace page 9, and have students complete the page independently.



3 Individuals complete WorkSpace page 10.

Explain the directions for WorkSpace page 10, and have students complete the page independently.



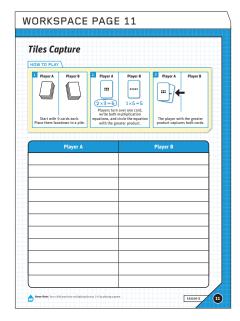
STEP

PARTNERS

Students play a multiplication game.

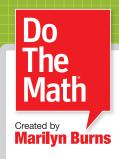
• Students practice and play *Tiles* Capture.

When a student completes the assessment, have him or her take a deck of Tiles Capture cards and practice figuring out the totals until another student completes the assessment, when the two can play the game, recording on WorkSpace page 11.



AFTER THE LESSON

Lesson 5 23



Students complete "Show What You Know" assignments every fifth lesson. These assignments help you monitor student progress and assess

understanding of the concepts and skills from the previous four lessons.

LESSON (5) Assessing Student Understanding

ASSESSMENT

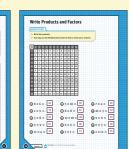
✓ Progress Monitoring

Objectives

- Represent rectangles with multiplication
- Calculate products with factors 0 through 12.
- · Communicate ideas with key math vocabulary; multiplication equation and product.

Assess

Use the annotated pages to correct *WorkSpace* pages 9 and 10.



Note the progress of each student in the appropriate rows on the tracking chart found on page 142 of this

Re-evaluating Student Placement

As you review each student's work from these four lessons and the assessment, you may suspect that a student does not have the foundations he or she needs to be successful in this module. You can use the End-of-Module Assessment from Do The Math™: Multiplication A to find out if the student has the necessary prerequisite skills. If the student does not score 80% on this assessment, or struggles to complete it, he or she will need additional guidance. Module A addresses these prerequisite concepts and skills.

Differentiating Instruction

Although the lessons are carefully scaffolded and paced at a rate more likely to give students a chance for optimal learning, there will be instances when students are still struggling and need extra support. Also, there will be instances when students would benefit from additional challenges or practice. Try the teaching ideas below.

For Students Who Need More Support

- Provide one-on-one additional practice for students to help remember the products.
- State two factors from 1 through 12.
- Have students locate the product on the *Multiplication*
- Doing this when there is a minute or two of extra time provides students with more opportunity to hear and say factors and products.
- Play the game *Tiles Capture* with students to help use strategies for finding products, and to reinforce important multiplication language.
- There are 4 rows with 3 tiles in each row.
- There are 4 equal groups with 3 in each group.
- 4 rows of 3 tiles is 4 times 3 tiles.
- Game instructions are available in the Teacher Bookcase, as well as on the *Do The Math* digital resources.

For Students Ready for a Challenge

- Have students play the game Tap It.
- Game directions are available from the Multiplication B game variation notes on the *Do The Math* digital resources.
- Provide students with different numbers of tiles to build more rectangles.
- Choose composite numbers of tiles such as 8, 9, or 14.
- Building the rectangles—and writing the related equations—reinforces the idea that the number of tiles used to form a rectangle is the product of the number of rows and the number of tiles in each row.
- It also reinforces the connection between the number of tiles and the product on the Multiplication Chart.

DIRECTIONS $2 \times 5 = 10$ Shade the square that covers the product Draw each rectangle if a rectangle is placed

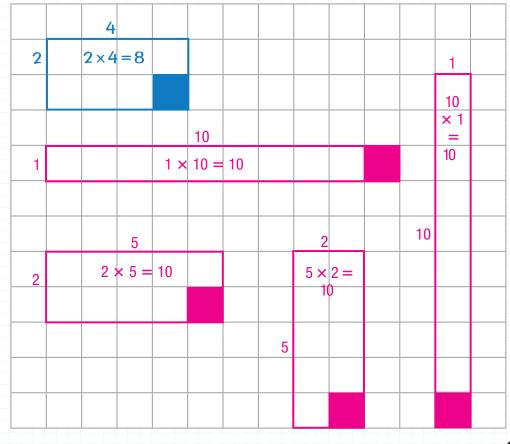
Write an equation.

Label the rectangle.

Here is an example with 8 tiles.

you build with 10 tiles.

Show What You Know



Home Note: Your child draws rectangles and writes equations for them.

Lesson 5

on the chart.

9

To review the fullsize Annotated **Teacher Version** of this WorkSpace see pages 9-10







Write Products and Factors

DIRECTIONS

- > Write the products.
- > You may use the *Multiplication Chart* to find or check your answers.

X	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

- $1 8 \times 6 = 48$
- $6 5 \times 10 = 50$
- $11 7 \times 4 = 28$

- $2 \times 9 = 18$
- $10 \times 3 = 30$

- $3 \times 8 = 24$
- $8 12 \times 10 = 120$
- $9 \times 8 = 72$

- $49 \times 9 = 81$
- $96 \times 6 = 36$
- $(4) 6 \times 5 = 30$

- $\boxed{5} 11 \times 4 = \boxed{44}$
- 15) 2 × 12 = 24

(10)

Lesson 5



Home Note: Your child writes products in equations.

Do The Math

Marilyn Burns

Created by