Literature Vocabulary

Math Vocabulary
(repeated vocabulary)
factors
products
multiplication
division
fact family
area model
array model

Materials
If possible, have two different color base ten sets per the following:

- Base ten sets (product, or inside the frame) – 1 flat, 18 longs, 35 units per student
- Base ten sets (factors, or frame) –5 longs, 18 units per student

If you do not have two colors, make sure your students have a total of both sets in the color that you do have.

Time Clue
BB = 1 minutes
CI = 26 minutes
AC = **1** minute

ELPS (*English Language Proficiency Standards*)
2A, 2C, 2F, 2I, 3H, 3I, 3J, 4C

CCRS *(College and Career Readiness Standards)*
Math
VIII.A.1,2,3,4,5; VII.B.1,2; VIII.C.1,3; IX.C.1,2,3.
Cross-Disciplinary
I.D.1,2,3,4; I.E.1,2.
ELA
II.A.4.6,7, 10; II.B.1; II.D.1; IV.A.3;

SMART BOARD
Show models of arrays and corresponding algorithms.

Unit 3, Lesson 1 3-4

TV Lesson

Read objectives while pointing to the words in the math lesson objectives. After each math objective, show children what that means.

Math Objectives:

- Represent multiplication facts by using a variety of approaches, such as repeated addition, equal-sized groups, array and area models, equal jumps on a number line and skip counting.
- Model factors and products using area and array models.
- Represent multiplication and division situations in pictures, word and number form.

Language Objectives:

- Use the math vocabulary during the activity.
- Discuss solution strategies.
- Explain the relationship of the array model to the number representation of multiplication and division.

Building Background, Math

You've been visualizing multiplication; that is, seeing the math movie in multiplication problems. As you think about multiplication, what operation can you use to "undo" multiplication? *(division)*

We're going to work with array models today to see the connection between multiplication and division. This connection will lead us to fact families. Let's look at one family, a fact family of 1, 12, 12.

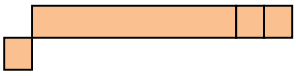
First, look at your base ten sets. Many of you may have two different colors. Separate those colors now. You have one color set of just five longs and 18 units. We're going to use these in an outside frame on our array building. Don't worry if you don't' have the two colors. We'll show you how to compensate. You have another set that has one hundred, 18 tens and 35 units. This set will be used to fill in the array.

Comprehensible Input

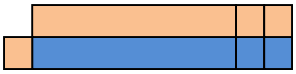
Suppose Millie had found egg cartons that held just the usual 12 eggs? Let's make an array to prove that one carton has 12 compartments in it. So our question is, how many compartments are there in one carton that holds a dozen eggs?

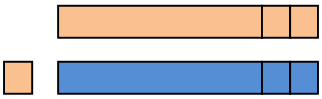
Classroom Teachers
Please circulate the room to see that students are not having difficulty representing the problems.

MAKING THE FRAME

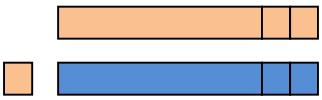


FILLNG THE FRAME





FACTORS and PRODUCTS



1 x 12 = 12

12 x 1 = 12

Unit 3, Lesson 1 3-4

TV Lesson - continued

MAKING THE FRAME

We know we have one carton. And that each carton has 12 compartments in it. What are the fewest base ten blocks that we can use to represent 12? *(pause)* (*One ten and two ones)*
Here is our frame. We are going to build an array inside this area. An array is a rectangle of rows and columns. This one has one row *(point or highlight the one unit)* and it has 12 columns *(highlight the columns)*.

FILLING THE FRAME

Let's fill the frame. What is the largest base ten block that can be used to begin to fill the frame? *(pause, a ten) (Place the ten rod.)* If you have your second color, please use that color to fill the frame. What other base ten blocks do we need to fill the frame? *(pause, two units) (place them)*

Now we have filled the frame. If you only have one color base ten blocks, pull your frame away. We only want to observe the filling.

- What number does the filling represent? *(pause)* Let's count it up.
- One ten and two ones.
- Do we need to make any trades? *(no)*
- That equals 12.

FACTORS AND PRODUCTS

We have created our frame using two numbers of the number family 1, 12, 12. The frame numbers are our FACTORS. The array that we built to fill the frame is the PRODUCT of our two FACTORS.

What number sentence could you write to represent our array as the product of two factors? *(pause)* When working with arrays and area models, we usually name the array as ROWS times COLUMNS. Let's use that mathematical understanding. We have one row. We have 12 columns. 1 x 12, and we know that the filling is 12 blocks. So 1 x 12 = 12.

That was very obvious, I know, but sometimes it's very helpful to start a new procedure with simple examples so you can really understand the relationships involved.

Now, if this array relationship represents 1 x 12 = 12, how could we show the relationship to the turn-around fact 12 x 1 = 12? *(pause)*

Rotate the whole model *(do so and ask students to do so)* and make a minor adjustment *(move the single unit to the top of the array)*. Now we see that our array shows us that we have 12 rows and one column. But our answer is still. . . Twelve.

TV Lesson - continued

REPRESENTING DIVISION

Suppose now that I knew I had a **total** of 12 compartments and I could see that I had 12 rows. What I didn't know is how many egg cartons I would have. I know, that is REALLY obvious, but let's work through that with our base ten model.

REPRESENTING DIVISION

I can start with the filling because I already know the TOTAL. *(Use the 12 out of the filling color.)* This is actually my product.

And I know that I have 12 rows, so I can use the 12 frame *(do so)*. This is actually one of my factors.

Now, I need the other factor. How many base ten blocks do I need to fill the frame? *(one unit – place it)* I now have my second factor.

What do the factors represent? *(Twelve represents the number of compartments in one egg carton; one represents the number of cartons.)*

12 ÷ 12 = 1

What does the product represent? *(the total number of compartments)*

And how can I represent in numbers what I just did? Talk to your teacher about that. *(pause)* This was a division problem. I had a total of 12 compartments *(point to the filling)*. So, if there are 12 compartments per carton, *(point to 12 in frame)* how many cartons did I have?

12 ÷ 12 = 1

12 ÷ 1 = 12

What if I knew I had a TOTAL of 12 compartments and that I had one egg carton? I would want to know how many compartments were in each carton. Now, I know the TOTAL, or product, of 12 *(show filling blocks)* and one carton, which is a frame or factor *(place one on the row)*. How many frame or factor blocks does it take to fill the top of the frame? Be sure to use the fewest number of blocks. *(12: one ten and two ones)*

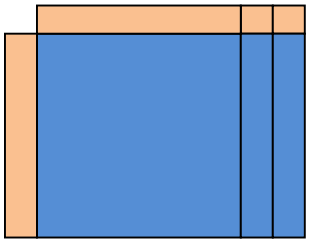
FACT FAMILY REPRESENTATION

We now have all four of the number sentences in our multiplication/division fact family for 1, 12, 12.

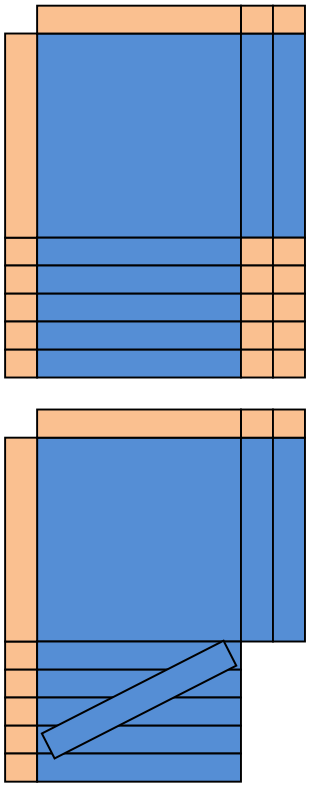
1 x 12 = 12 12 x 1 = 12
12 ÷ 1 = 12 12 ÷12 = 1

Let's try one a little more challenging. What if Millie Mouse had found 10 of those dozen-egg cartons?

10 x 12



15 x 12



Arthimus Portio's Corner
Lesson 1 - Graph
Which monster did your class select as the friendliest monster? Why do you think that is so? What makes the choice scarier than others on the graph?

Unit 3, Lesson 1 3-4

TV Lesson - continued

(Follow the same process, but Millie has 10 egg cartons with 12 compartments each. How many total compartments are there? (10 x 12) *You will have one hundred in each. Be sure you have asked, "What is the largest base 10 block you can use to start filling this frame?" The hundred block. And, of course, ask, "Do you have enough to make a trade?" (no) Count up the blocks:*
100 + 20 = 120 *10 x 12 = 120*

Millie had 15 egg cartons with 12 compartments each. How many total compartments are there? You will have trading in 15 x 12. Be sure that you ask each time, "Do we have enough to make a trade?"(yes) Take 10 units and trade for one ten. Place the ten across another group of tens. Count up the blocks. 100 + 80

It is critical that you work through this last problem with the students before the end of the lesson.

You'll be solving multiplication and division word problems, but also creating at least one of each.

Pirate: (Discuss the Pirate's Corner task.)

Objectives: And now before we go, let's review what we have learned today! *(do so)*