Lesson 3.3

Use Arrays and Partial Products to Multiply

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When you hear multiplication, give one word that comes to mind.

ⓘ Start presenting to display the poll results on this slide.

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STANDARD: NC.4.NBT.5

- Multiply a whole number of up to three digits by a one-digit whole number.
- Multiply up to two two-digit numbers with place value understanding using area models, partial products, and the properties of operations.
- Use models to make connections and develop the algorithm.

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I CAN STATEMENT & ESSENTIAL QUESTION

I can use use arrays and partial products to multiply.

How can you use use arrays and partial products to multiply?

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Mathematics Objective:

Today we will use arrays and partial products to multiply 2- and 3-digit numbers by 1-digit numbers.

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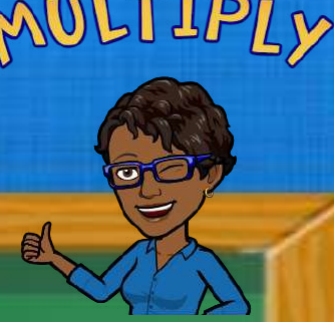
Using an Array to find Partial Products
This video shows you how to use an array to find partial products.

Partial Products

Vocabulary:



multiply	the result of repeated additions of equal groups.
factor	the numbers that are multiplied together to make a product.
product	the answer to a multiplication problem.
multiple	the product of a given number and any nonzero whole number (factor).
array	A way of displaying objects in rows and columns.

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Vocabulary:

numerical expression	an expression that contains numbers and at least one operation.
equation	A number sentence that uses the equal sign (=) to show that two expressions have the same value. Example: 9 + 3 = 12
area model	a rectangle used to model multiplication and division of whole numbers.
partial product	Products found by breaking one factor in a multiplication problem into ones, tens, hundreds, and so on, and then multiplying each of these by the other factor.

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Vocabulary:

commutative property of multiplication	factors can be multiplied in any order and the product stays the same. Example: 3 x 200 or 200 x 3
associative property of multiplication	factors can be regrouped and the product stays the same. Example: 3 x (2 x 100) or (3 x 2) x 100
distributive property of multiplication	multiplying a sum (or difference) by a number is the same as multiplying each number in the sum (or difference) by that number and adding (or subtracting) the products. Example: (3 × 21) = (3 × 20) + (3 × 1)

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Vocabulary:

identity property of multiplication	The product of any number and one is that number. Example: 1 x 200 = 200 or 1,000 x 1 = 1,000
zero property of multiplication	The product of any number and zero is zero. Examples: 3×0=0; 5×0=0

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Example #1

Target just displayed 13 cans of lemon-mango juice on 3 shelves, forming an array. How many total cans are there?

- Build the array to create the expression!

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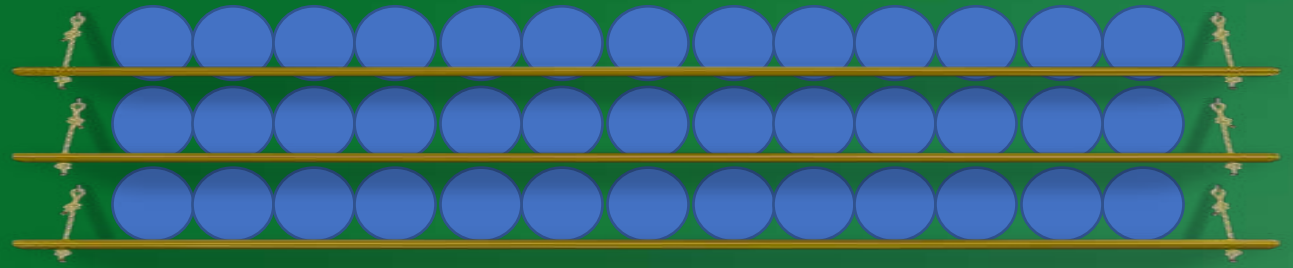

You could count all of the cans in this ARRAY, one by one. You could also use the traditional algorithm to multiply 3 x 13.
Let's look at another way. Go on to see!

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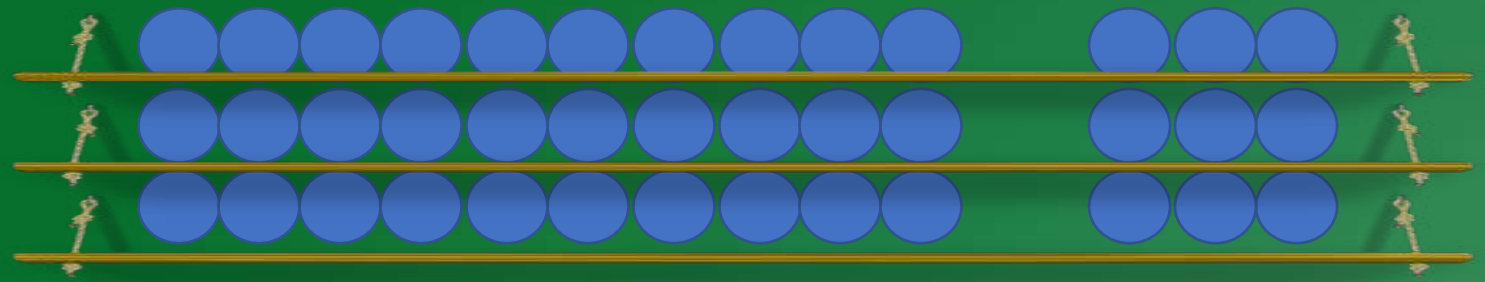

Let's move the cans into two groups. The first has 3 rows with 10 objects in each row. The second has 3 rows with 3 objects in each row. We still have 3 rows with 13 objects in each row, just like before but we can use this to multiply two digit numbers mentally!

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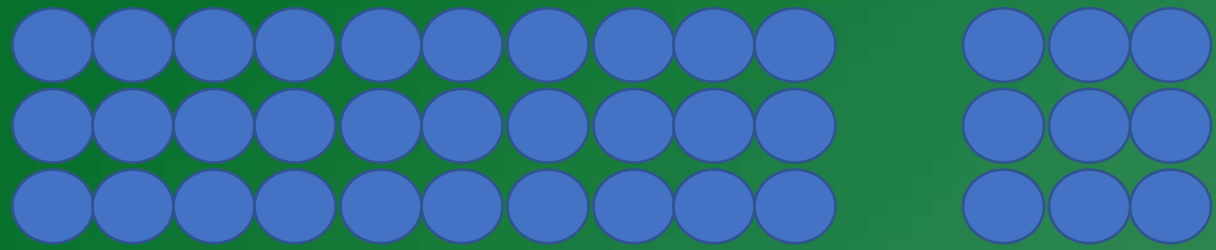

We broke the array apart to multiply!
Instead of 3 x 13, we multiplied
3 x 10 = 30 and 3 x 3= 9
30 + 9 = 39

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Example #2

With larger numbers you can use manipulatives. Find 144 x 2?

- Use your manipulatives to build the expression.!

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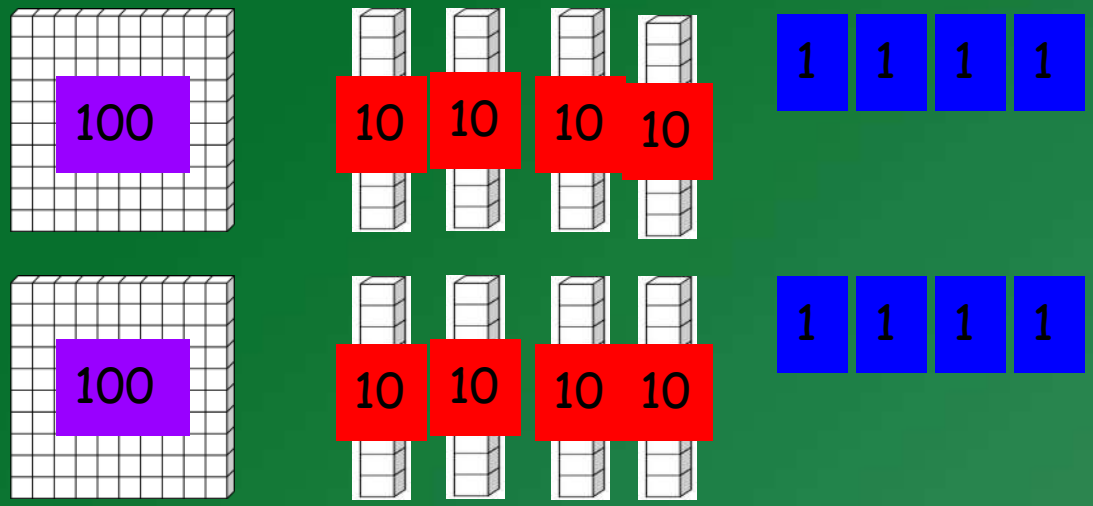
1 flat=100, 1 rod=10, and 1 square unit=1. To multiply 144 x 2 we break it apart (100 + 40 + 4) x 2

100 x2 = 200

40x2 = 80

4x2 = 8



$$\begin{array}{r} 200 \\ 80 \\ +\ \ 8 \\ \hline 288 \end{array}$$

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Distributive Property

Multiplying a sum (or difference) by a number is the same as multiplying each number in the sum (or difference) by that number and adding (or subtracting) the products.

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MULTIPLY

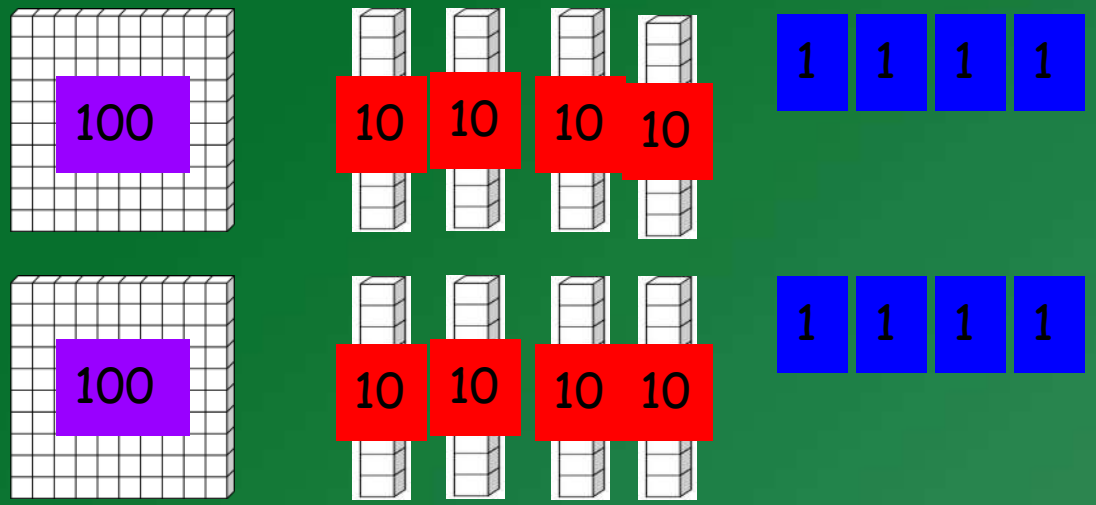
This is an example of distributive property. We broke it apart and distribute the 2 to each addend!

(100 + 40 + 4) x 2

100 x 2 = 200

40 x 2 = 80

4 x 2 = 8



200 ← 100 x 2

80 ← 40 x 2

+ 8 ← 4 x 2

288

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Partial Products

200 ← 100 x 2

80 ← 40 x 2

+ 8 ← 4 x 2

288

Products found by breaking **one factor** in a multiplication problem into ones, tens, hundreds, and so on, and then multiplying each of these by the other factor 144 x 2

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This example follows the same rules as the array. As you can see, we still have 2 rows with 100 objects in it, 2 rows with 40 objects in it, and 2 rows with 4 objects in it. We just didn't draw it out.

200	⟵	100 x 2
80	⟵	40 x 2
+ 8	⟵	4 x 2
288		

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What would an array of 327 x 3 look like?

- Use your manipulatives to show the above expression.

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MULTIPLY

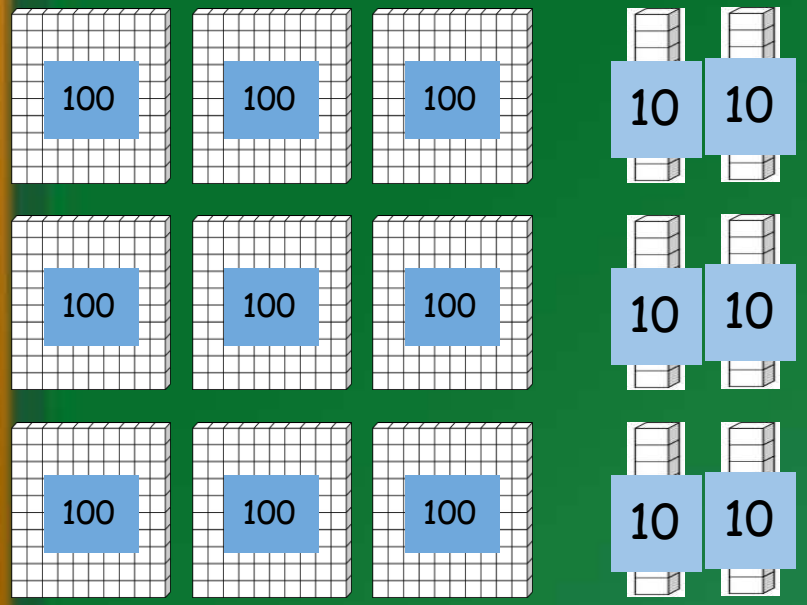
Break apart using ones, tens, hundreds, and so on….

327 x 3

300 x 3 = 900

20 x 3 = 60

7 x 3 = 21



900 ← 300 x 3

60 ← 20 x 3

+ 21 ← 7 x 3

981

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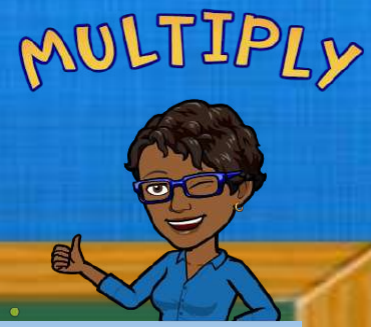
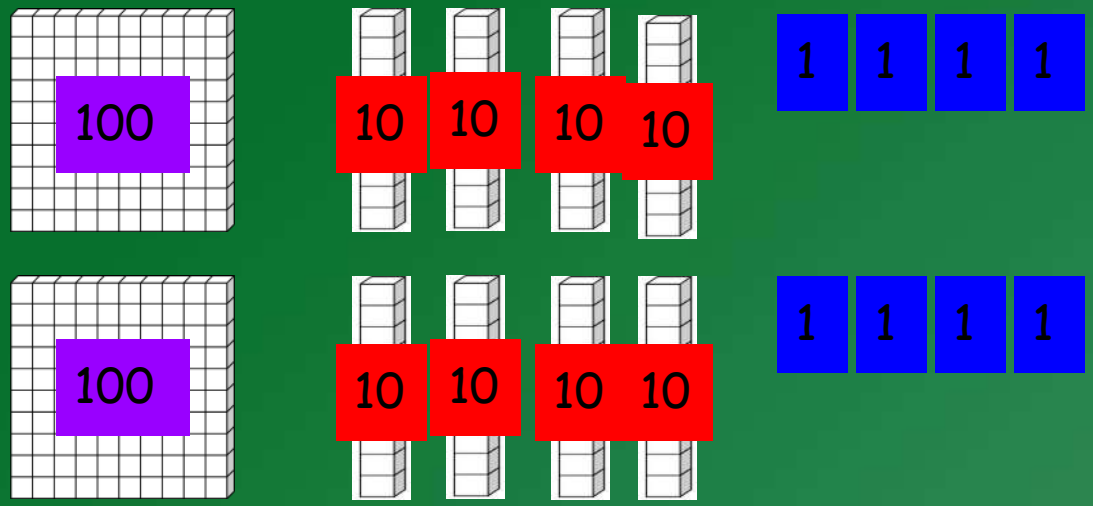


This is an example of distributive property. We broke it apart and distribute the 2 to each addend! (100 + 40 + 4) x 2

100 x2 = 200

40x2 = 80

4x2 = 8



200	100 x 2
80	40 x 2
+ 8	4 x 2
288	

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PRACTICE

You may already know some of your basic multiplication facts. Use partial product to find the following problems.

13 x 4 45 x 6 265 x 3 691 x 2

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The local charity sold plates to help raise money for the 4th grade trip to Disneyland. They only sold plates on Friday, Saturday, and Sunday after 2 pm. Each day they made $1,692. How much money did they make during these three evenings combined? Use the partial products algorithm to solve.

PRACTICE

PRACTICE

PRACTICE

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For your class assignment you will finish move to stations...

Lesson 3.3 Practice Buddy

Remember while at your stations to please work quietly on your assignments. After the timer goes off, quietly rotate to your next station!!

When you finish your assignment, make sure to go to google classroom and submit your assignment.

Students, follow the instructions on the slide