4th Grade Multiplication and Division Strategies

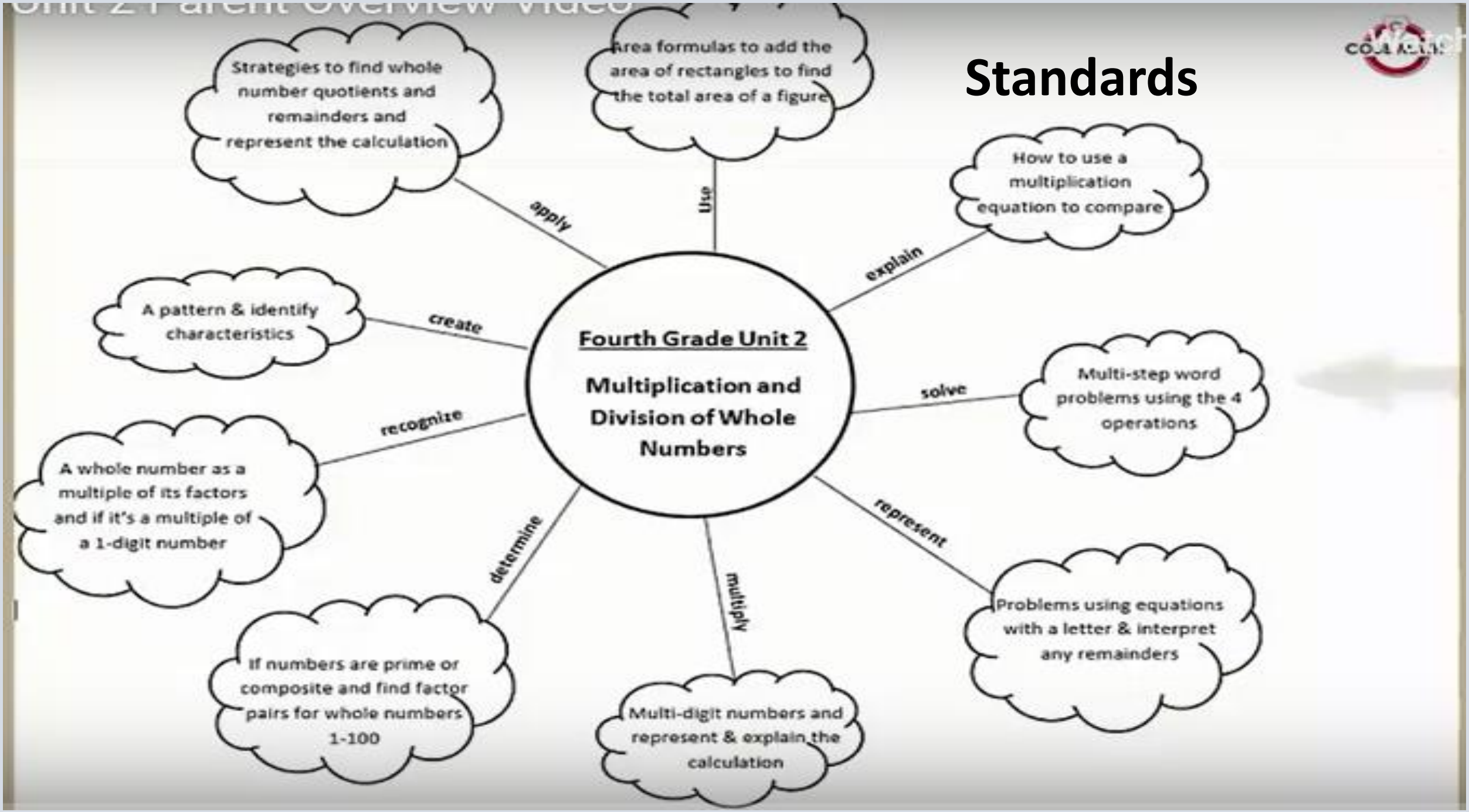
Mini Open House

Our Purpose

1. Introduce the multiple strategies that 4th grade students will be utilizing this nine weeks for multiplication and division
2. Provide an opportunity for you to practice the strategies

Please keep in mind that 4th grade does not utilize the standard algorithm to solve multiplication or division problems.

Standards


Fourth Grade Unit 2
Multiplication and Division of Whole Numbers
apply
Strategies to find whole number quotients and remainders and represent the calculation
Use
Area formulas to add the area of rectangles to find the total area of a figure
explain
How to use a multiplication equation to compare
create
A pattern & identify characteristics
solve
Multi-step word problems using the 4 operations
recognize
A whole number as a multiple of its factors and if it's a multiple of a 1-digit number
represent
Problems using equations with a letter & interpret any remainders
determine
If numbers are prime or composite and find factor pairs for whole numbers 1-100
multiply
Multi-digit numbers and represent & explain the calculation

Vocabulary

area model: a model for multiplication and/or division problems, in which the length and width of a rectangle represents the factors, or quotient and dividend
composite: a whole number that can be divided evenly by numbers other than one and itself (0 and 1 are neither prime nor composite)
distributive property: allows you to multiply a sum by multiplying each addend separately and then adding the products
dividend: the number to be divided
divisor: the number used to divide by
equation: mathematical expression where one part is equal to another part
expression: numbers and symbols with no equal sign

factors: numbers you multiply together to get another number
multiples: the result of multiplying a number by another number
place value: value of a digit according to its place in a number
prime: a whole number that can be divided evenly only by one or itself (0 and 1 are neither prime nor composite)
product: the answer to a multiplication problem
quotient: the answer to a division problem
rectangular array: arrangement of objects into rows and columns that form a rectangle
rectilinear: a polygon with all right angles
remainder: the amount left over after division

Partial Products for Multiplication

- One of the key components of this strategy is making sure your partial products are lined up properly.
- Partial Products uses the value of each digit to solve for the product of the whole problem.

Abbreviations

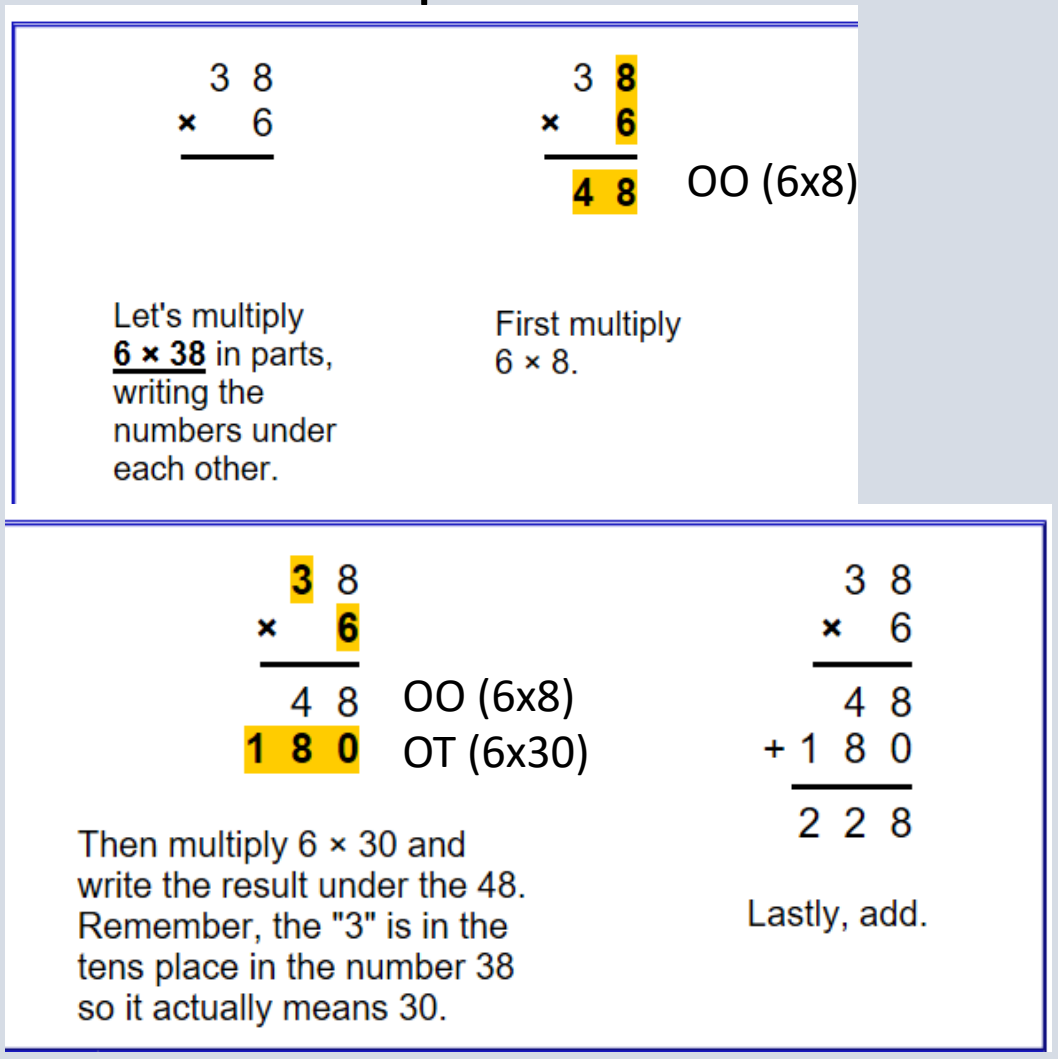
- O-ones
- T-tens
- H-hundreds

Steps for Partial Products Double digit times a single digit

In each step….you are multiplying by the value of the digit.

- First you start with the bottom factor and multiply that factor with the ones digit from the top factor.
- Then you multiply the same bottom factor with the tens digit (the value) from the top factor.
- After you have multiplied each factor you need to add up all of the partial products to get your final product.

Sample



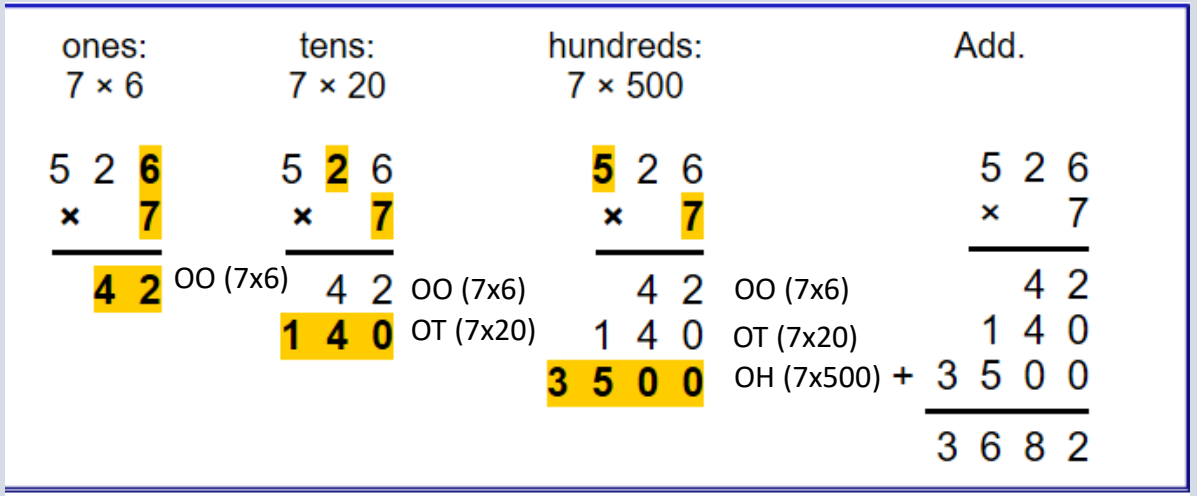
Steps for Partial Products

Triple digit times a single digit

In each step….you are multiplying by the value of the digit.

- First you start with the bottom factor and multiply that factor with the ones digit from the top factor.
- Then you multiply the same bottom factor with the tens digit (the value)from the top factor.
- Then you multiply the same bottom factor with the hundreds digit (the value)from the top factor.
- After you have multiplied each factor you need to add up all of the partial products to get your final product.

Sample



Steps for Partial Products Four digits by a single digit

In each step….you are multiplying by the value of the digit.

- First you start with the bottom factor and multiply that factor with the ones digit from the top factor.
- Then you multiply the same bottom factor with the tens digit (the value)from the top factor.
- Then you multiply the same bottom factor with the hundreds digit (the value)from the top factor.
- Then you multiply the same bottom factor with the thousands digit (the value)from the top factor.
- After you have multiplied each factor you need to add up all of the partial products to get your final product.

Sample

3,691

X 4

4 OO (4x1)

360 OT (4x90)

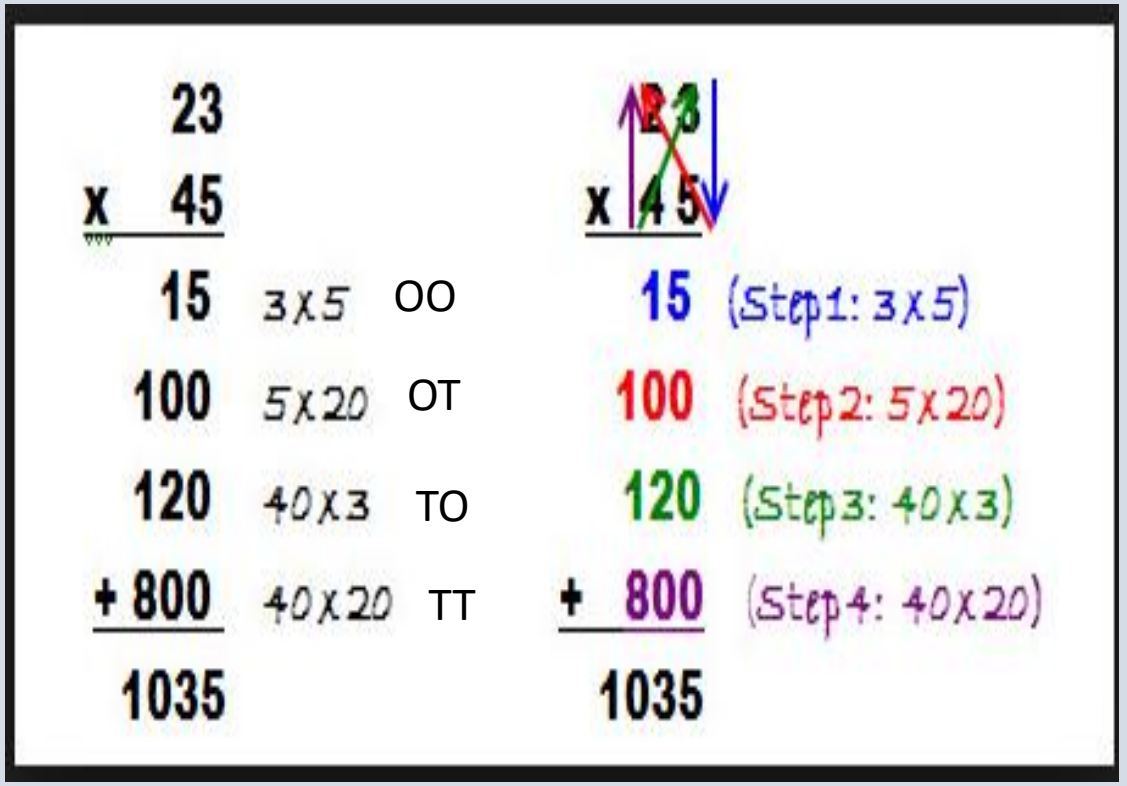
2400 OH (4x600)

+ 12000 OTh (4x3,000)

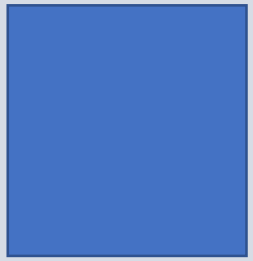
14,764

Partial Products with Two Digits X Two Digits

- You start by multiplying the bottom factor to the top factor. Since the bottom factor has two digits you need to start with the digit in the ones place and multiply it by the digit in the ones place in the top factor.
- Then you will multiply the ones digit in the bottom factor by the tens digit (the value) in the top factor.
- If there were to be a hundreds digit in the top factor, you would continue the same process.
- Then you will multiply the tens place from the bottom factor (the value)with the digit in the ones place of the top factor.
- Then you will multiply the tens place from the bottom factor (the value)with the digit in the tens place (the value)of the top factor.
- If there were to be a hundreds digit in the top factor, you would continue the same process.
- After you have multiplied each factor you need to add up all of the partial products to get your final product.



Value of manipulatives

100  (10 columns by 10 rows)

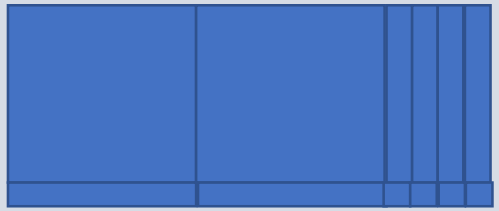
10  **Or**  (1 column by 10 rows)
or (10 columns by 1 row)

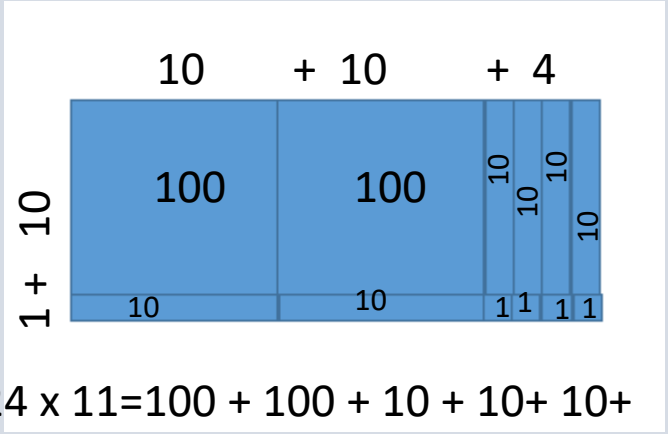
1 

Area model (using base 10 blocks) (2 digit x1 digit)

- Count the number of columns across each manipulative and write it above the manipulative.
- Then count the number of rows down the manipulative and write it to the left side.
- Write the product of the top factor and side factor in the box (keep in mind the value of each manipulative to make this easier).
- Add up all the partial products or the value of each manipulative to find the total product.

Problem/Model





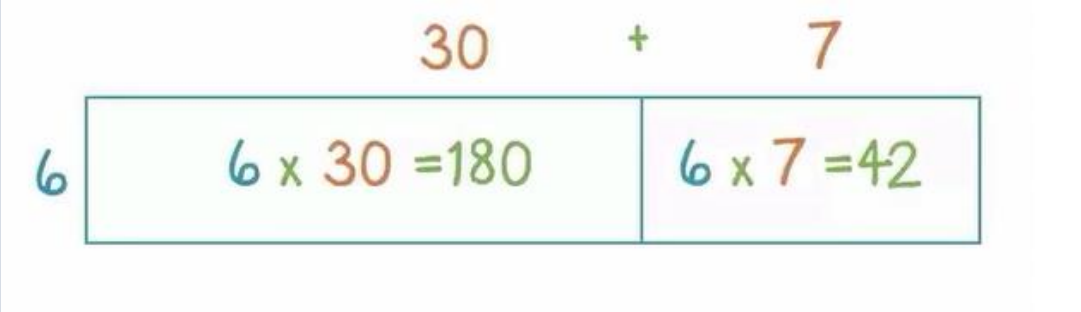
Problem= 24 x 11=100 + 100 + 10 + 10+ 10+ 10+ 10 + 10 + 1 + 1+ 1+ 1= 264

Or 2 (100) + 6 (10) + 4 (1)= 264

Area Model of Multiplication (2 digit by 1 digit)

- The number of digits in each factor determines the number of boxes.
- Split the first number (factor) into expanded form and above each box. Write the second factor on the side of the box.
- Then multiply the number on top of the box by the number on the side. Do this as many times as there is a number above the box.
- Add up each partial product to find the product of the entire problem.

37x6



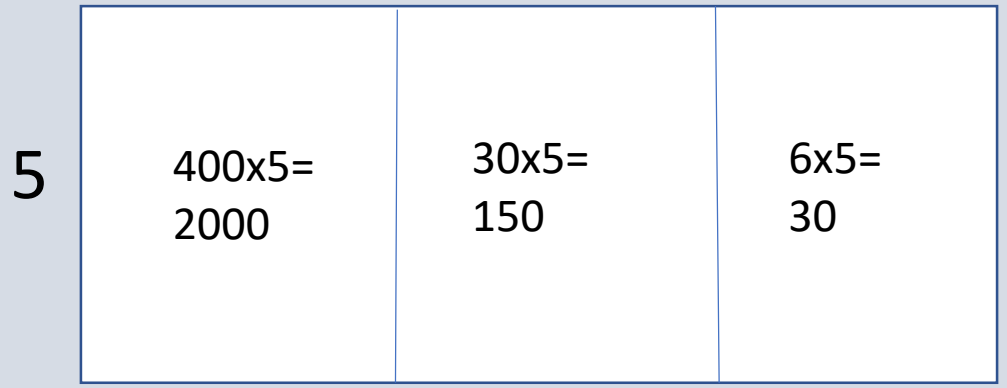
180 + 42 = 222

Area Model of Multiplication (3 digit by 1 digit)

- The number of digits for each factor determines the number of boxes.
- First split the first number (factor) into expanded form and above each box. Write the second factor on the side of the box.
- Then multiply the number on top of the box by the number on the side. Do this as many times as there is a number above the box.
- Add up each partial product to find the product of the entire problem.

436 x 5=_____

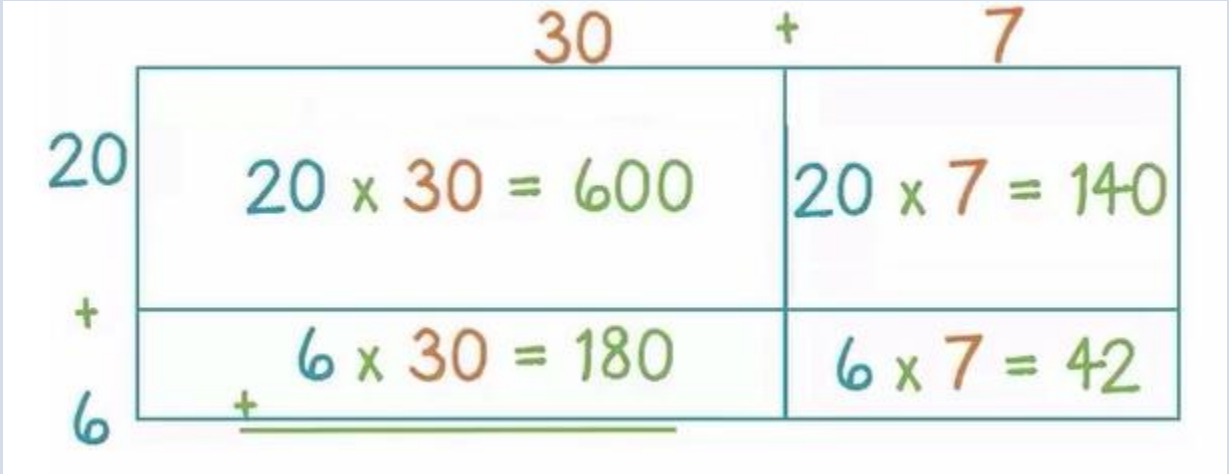
400 + 30 + 6



2000+150+30=2,180

Area Model of Multiplication (2 digit by 2 digit)

- The number of digits for each factor determines the number of boxes.
- Then split the first number (factor) into expanded form and above each box. Do the same with the second factor and it goes down the side.
- Then multiply the number on top of the box by the first number on the side. Do this as many times as there is a number above the box.
- Then multiply the number on the top of the box by the second number on the side. Do this as many times as there is a number above the box.
- Add up each partial product to find the product of the entire problem.



600 + 140+ 180 + 42= 962

Division using repeated subtraction

- The dividend is “inside the house”, the divisor is “outside the house” and the quotient is “on the roof.”
- Repeatedly subtract the divisor from the quotient.
- Keep track with a tally of “1” as many times as needed to subtract the divisor.
- The total number of times the divisor was subtracted is the quotient. Be sure to include any remainder (must be less than the divisor).
- Note: avoid using this strategy with large dividends

5 | 20

-5 (1)

15

-5 (1)

10

-5 (1)

5

-5 (1)

0 (4 total times)

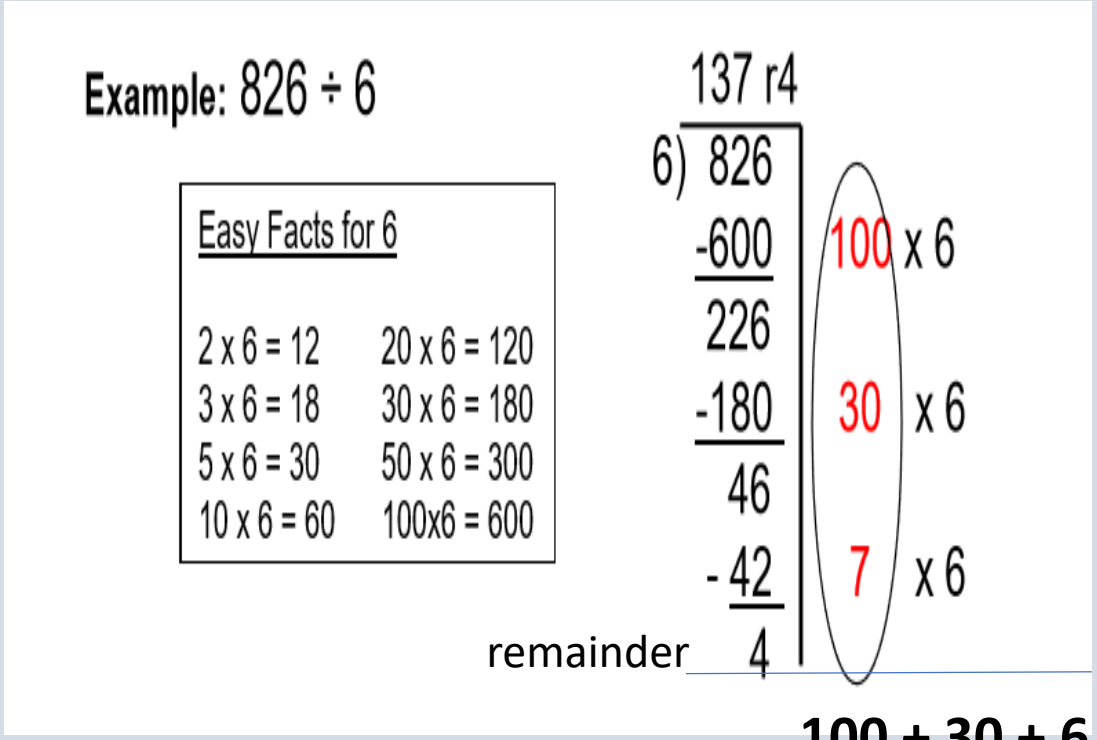
So, 20 divided by 5=4

Dividing with Strategies

- Knowing multiplication facts is key to being able to divide.
- The stronger one is with facts...the larger the numbers one will be able to use to be able to divide. That can result in fewer steps being taken.

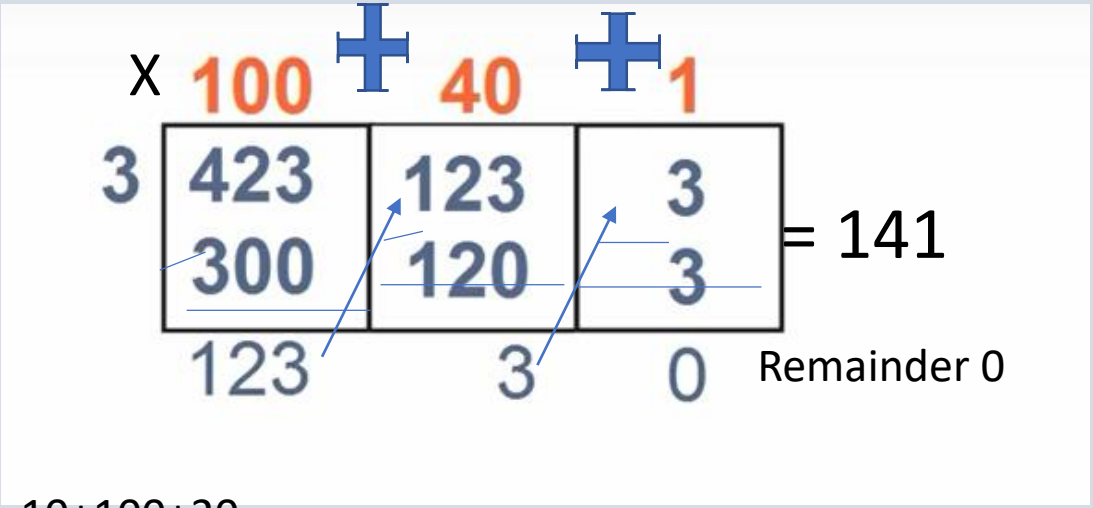
Division using partial quotients

- Write a list of easy facts for the divisor.
- Subtract from the dividend an easy multiple of the divisor (EX x 100, x 10, x 5)
- Record the partial quotient in a column to the right of the problem. The product of those two numbers goes under the dividend in an ongoing subtraction problem.
- Repeat until the dividend has been reduced to zero or the remainder is less than the divisor.
- Add the partial quotients to find the quotient for the problem.



Division using the “box method”

- Set up your problem by drawing a box and placing your divisor on the outside of the box and your dividend on the inside.
- Break up your dividend by subtracting multiples of the divisor until you reach zero or you have a remainder that is smaller than the divisor.
- The larger the factor you are able to use the fewer steps that can be taken.



10+100+20

3

423	393	93	Continue until you have a remainder or 0.
- 30	-300	-60	
393	93	33	

Additional Visuals

Math

By the time students reach 4th grade, they have mastered addition and subtraction strategies. Students now understand the standard algorithm for addition and subtraction and are able to apply it fluently to solve real-world problems.

Fourth graders come to this grade level knowing multiplication facts from memory. Students can use strategies to help them with these facts:

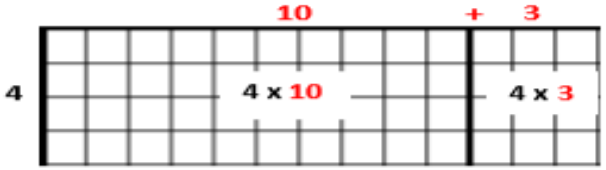
8 x 9 could be seen as

8 x 10 = 80
80 – 8 = 72

OR

8 x 5 = 40
8 x 4 = 32
72

A fourth grade student is familiar with building simple multiplication problems using base ten blocks. This drawing shows the problem **4 x 13**.



Students investigated working with the distributive property in grade 3.

(4 x 10) + (4 x 3)
40 + 12 = 52

A strategy that helps students multiply numbers mentally is *doubling and halving*.

Here the student halves one number and multiplies the other number by two to get a friendly number that is easy to work with mentally.

Students now begin to work with the *area model of multiplication* using 2-digit x 2-digit numbers.

Here a student has built a 12 x 23 area model that shows the product 276.

Once again, the distributive property (based on the model) helps students understand multiplication.

12 x 23 = 276
(10 + 2) x (20 + 3)
(10 x 20) + (2 x 20) + (10 x 3) + (2 x 3)
200 + 40 + 30 + 6 = 276

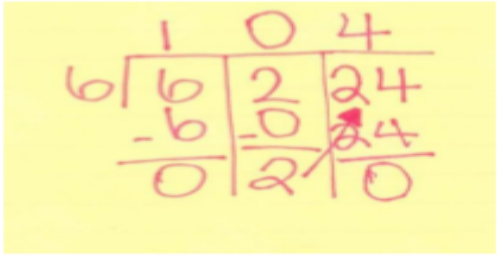
Once students have understood the models and can apply the distributive property to these multiplication problems, they move to *partial products*.

	40	9
20	800	180
6	240	54

Students draw models and calculate the product.

49
x 26
800
240
180
+ 54
1274

Fourth graders explore division by finding whole number quotients and remainders using strategies based on place value and the properties of operations. A strategy based on place value that is used to assist students with understanding division is *explicit trades*.



In this example, the student had to trade 2 tens for 20 ones. This should be clearly explained using place value language.

Thank you for attending!

Please let us know if you have any questions.

Looking for more resources...

Quarter 2 Parent Video