NORD ANGLIA EDUCATION

A Lesson that counts
Year 4-6

01.11.17

What are we going to cover today?

- Addition
- Subtraction
- Division
- Multiplication

Year 4 Targets

Number - addition and subtraction

Pupils should be taught to:

- add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why

Year 4 Targets

Number - multiplication and division

Pupils should be taught to:

- recall multiplication and division facts for multiplication tables up to 12 × 12
- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together 3 numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects

Year 5 Targets

Number - addition and subtraction

Pupils should be taught to:

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- add and subtract numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Year 5 Targets

Number - multiplication and division

Pupils should be taught to:

- identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 numbers
- know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19
- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- multiply and divide numbers mentally, drawing upon known facts
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000
- recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})
- solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates

Year 6 Targets

Number - addition, subtraction, multiplication and division

Pupils should be taught to:

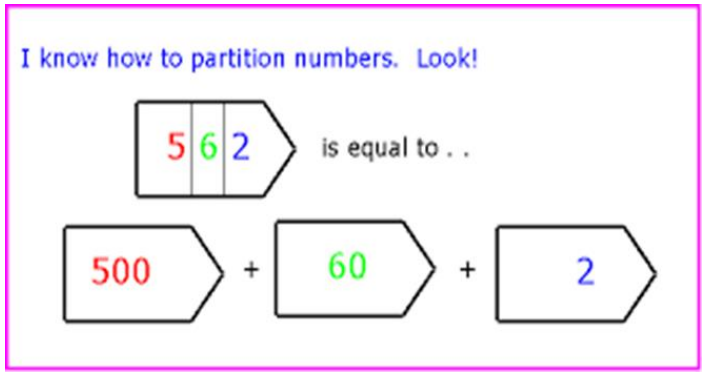
- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- perform mental calculations, including with mixed operations and large numbers
- identify common factors, common multiples and prime numbers
- use their knowledge of the order of operations to carry out calculations involving the 4 operations
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

Addition

What Methods do we teach?

Column addition

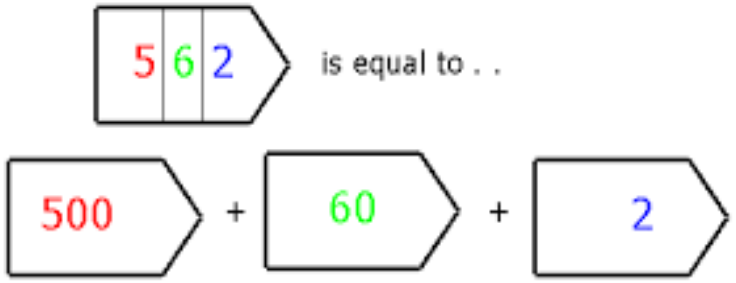
Partitioning



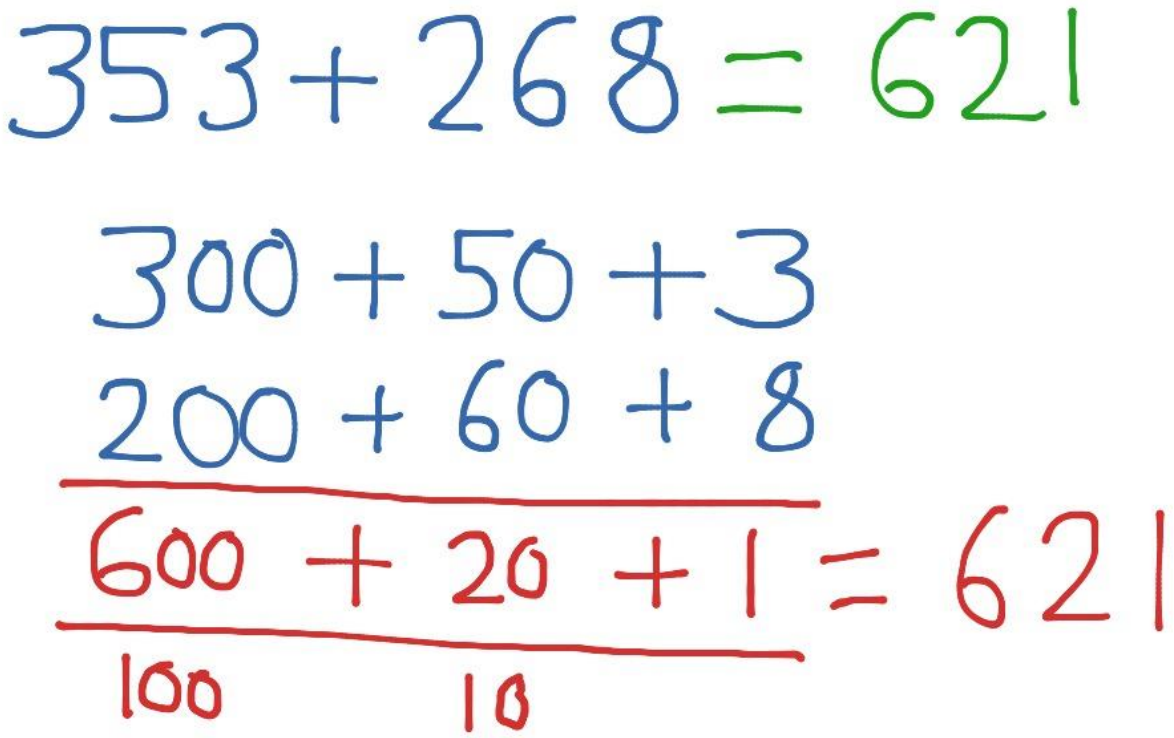
$$\begin{array}{r} {}^{1}\,4\,2\,7 \\ +\;3\,6\,3 \\ \hline 7\,9\,0 \end{array}$$

Partitioning

I know how to partition numbers. Look!



Expanded Column Addition



Column Addition

https://www.youtube.com/watch?v=fOXo4p4WDKM

Up to 4.20

Estimate and use inverse operations to check answers

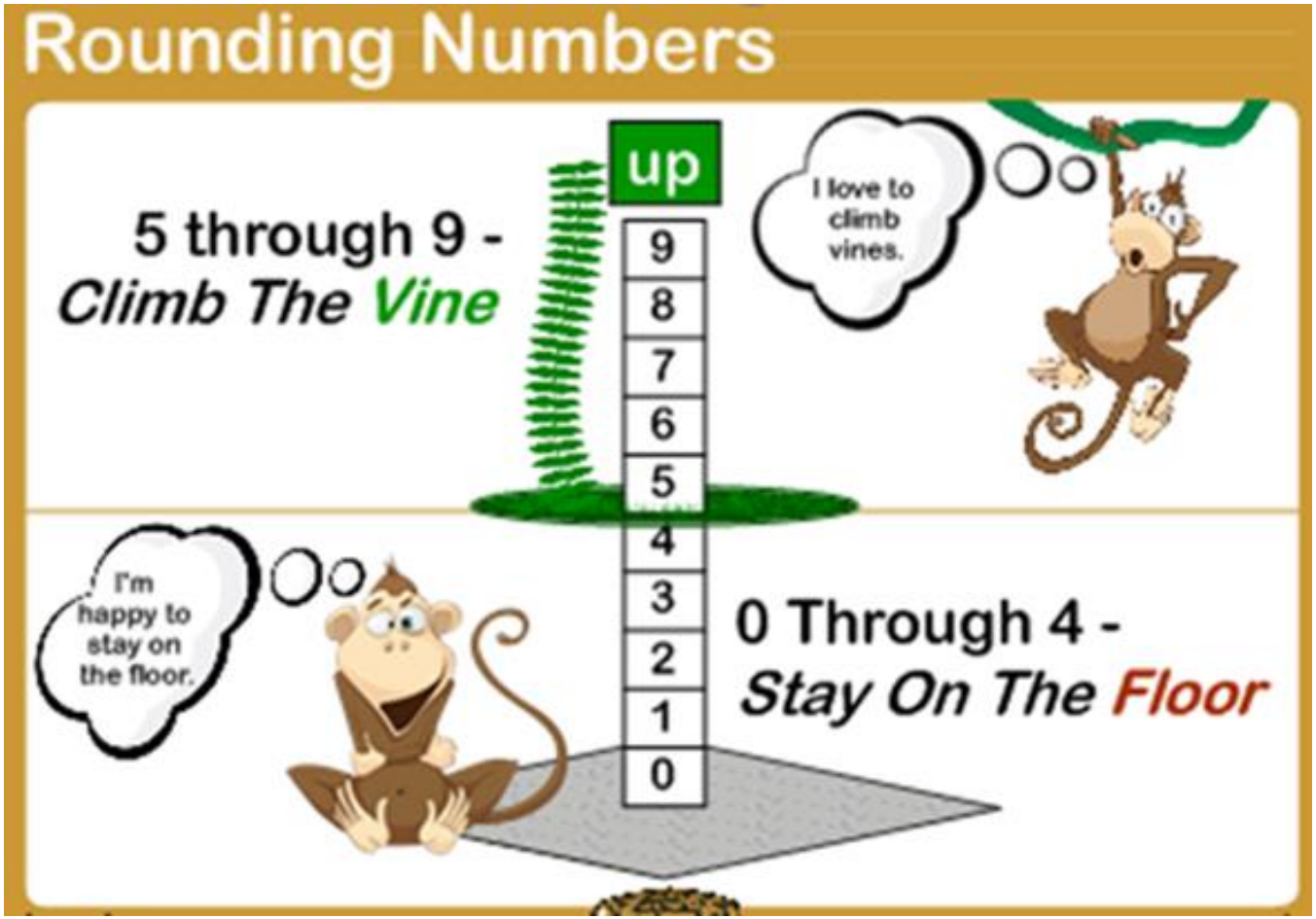
2 + 4 = 6

6 - 4 = 2

6 - 2 = 4

So, if 238 + 169 = 407 what other number sentences can you make?

Rounding numbers



Rounding numbers

Starting number	Nearest 10	Nearest 100	Nearest 1000	Nearest whole number
3954				
9146				
6479				
5.31				
3.6cm				
99.9m				
£67.09				
£145.58				
738				
32				

Success criteria:

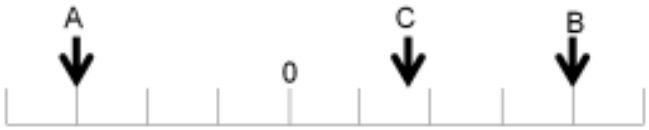
- ✓ Round the numbers to the nearest 10 or 100 and write the estimate calculation
- ✓ Use an efficient written strategy to solve the original problem
- ✓ Compare your estimate with the actual answer
- ✓ Use the inverse operation to check

1. 478+561

Use their knowledge of the order of operations to carry out calculations involving the 4 operations.

- Abdul says "If I add any two 4 digit numbers together is will make a 5 digit number."
  Do you agree? Explain why.

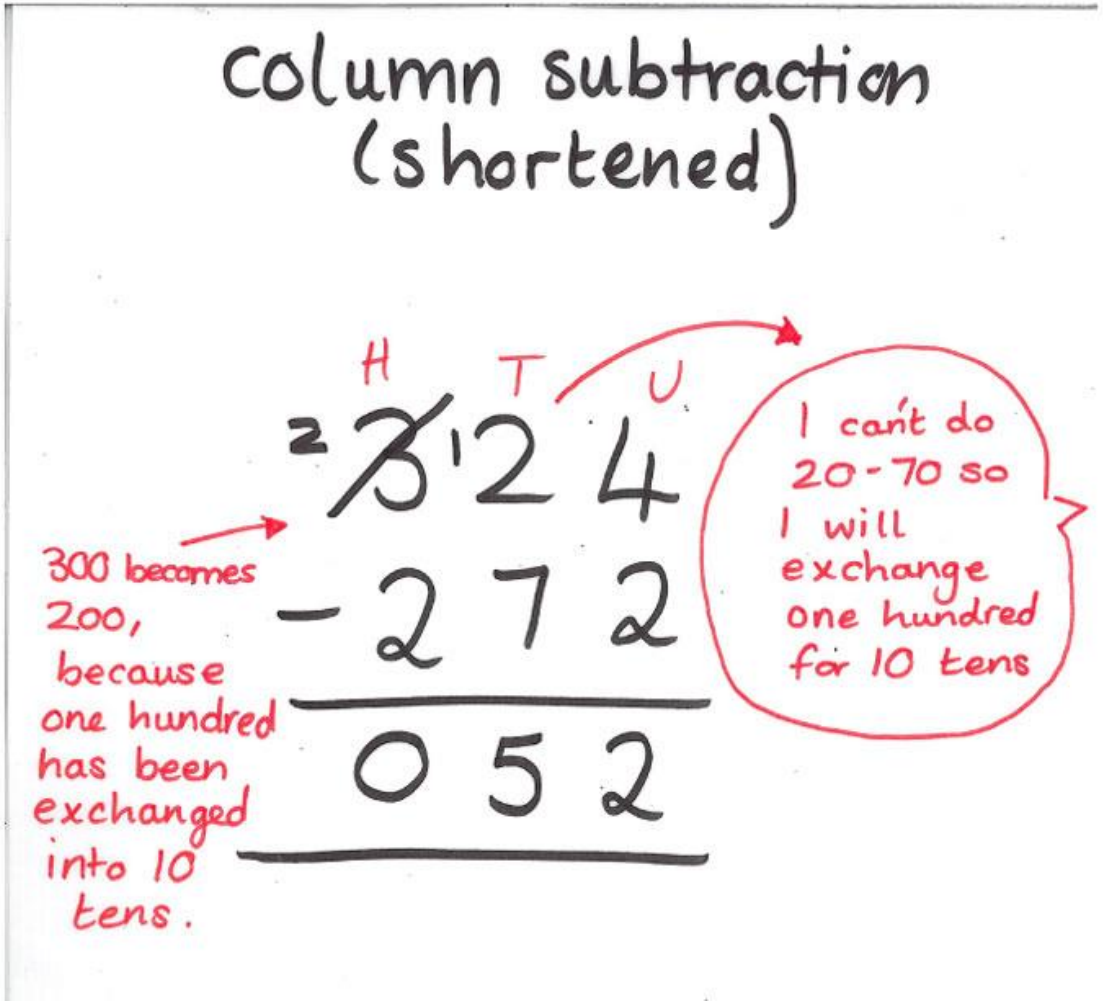
- Three numbers are marked on a number line.



The difference between A and B is 28
The difference between A and C is 19
D is 10 less than C
What is the value of D?
How do you know?

- Three pandas are eating bamboo sticks. There are 51 altogether. They all eat an odd number of sticks. How many bamboo sticks did they each eat? How many different ways can you do it?

Methods for Subtraction



Subtraction

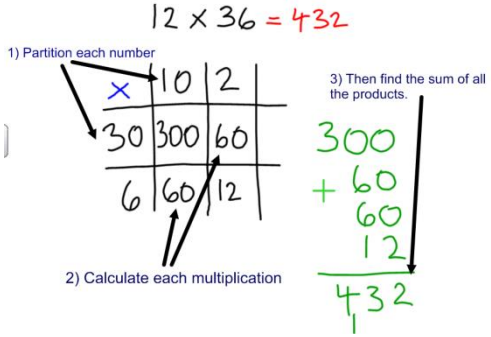
One up, one down method.

https://www.youtube.com/watch?v=I6jinLA1AxA

Multiplication

What methods do we teach?

Grid



Arrays

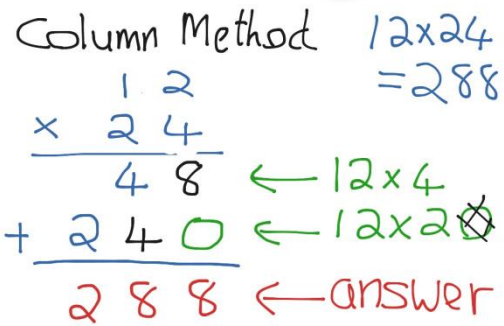
4 x 6 = 24

6 x 4 = 24

Instant recall

Up to 12 x 12

Long



Grid Method

$12 \times 36 = 432$

1) Partition each number

×	10	2	
30	300	60	
6	60	12	

2) Calculate each multiplication

3) Then find the sum of all the products.

$$\begin{array}{r} 300 \\ +\ 60 \\ 60 \\ 12 \\ \hline 432 \\ {\scriptstyle 1} \end{array}$$

Arrays

factor factor product

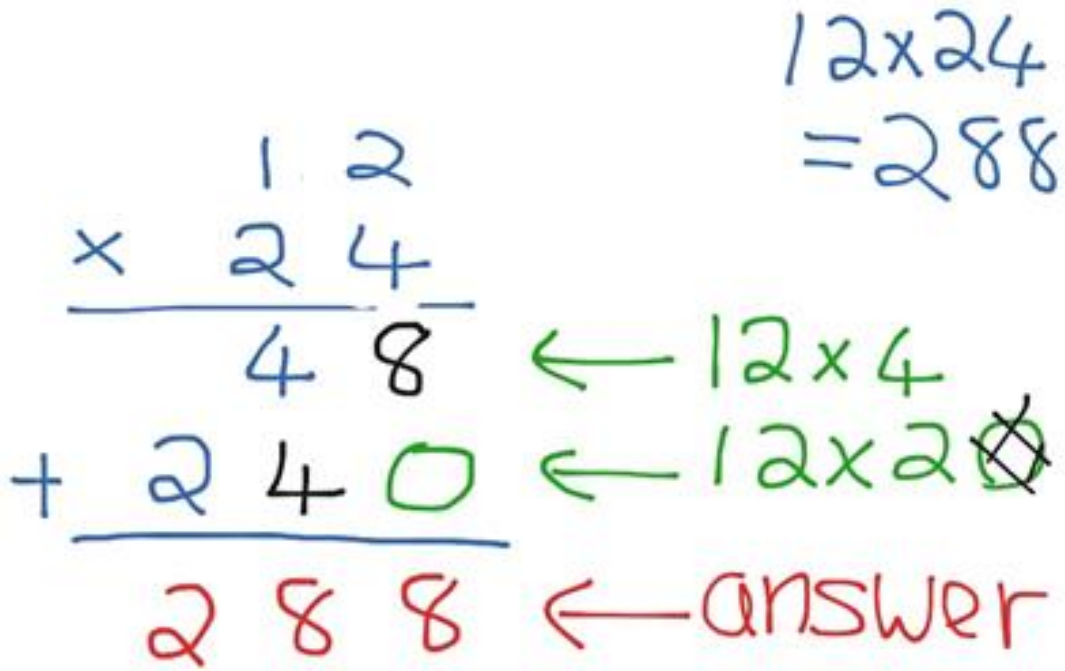
$3 \times 6 = 18$

number of groups

number in each group

number in all

Long multiplication



Identify common factors, common multiples and prime numbers.

Factors of 12: 1, 2, 3, 4, 6, 12

Factors of 16: 1, 2, 4, 8, 16

Common Factors

4 is the Greatest Common Factor

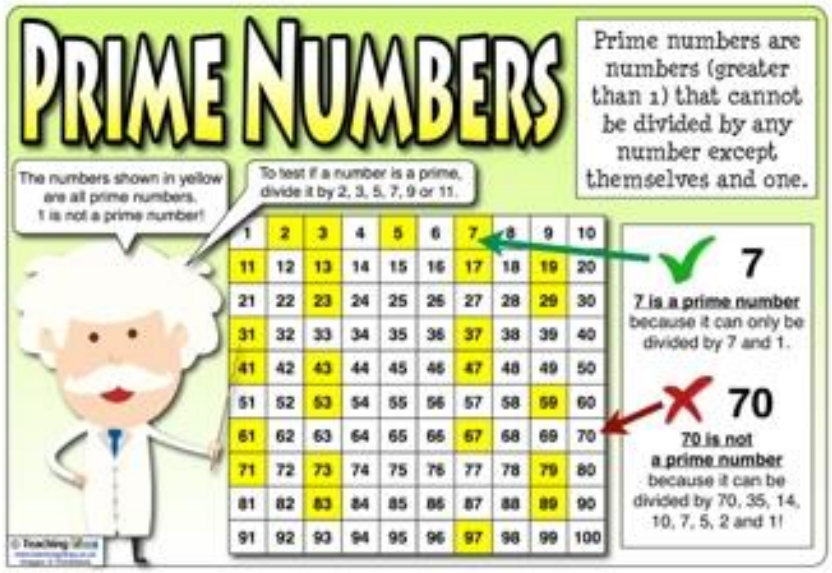
Multiples of 3:

0, 3, 6, 9, 12, 15, 18, 21, 24, ...

Multiples of 4:

0, 4, 8, 12, 16, 20, 24, 28 ...

The LCM of 3 and 4 is 12.



Multiply and divide whole numbers and numbers involving decimals by 10, 100 and 1000.

Multiplying and Dividing by 10, 100 and 1000

10 000	1000	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
				●			

Multiplying

X 10 digits move LEFT **1** space
X 100 digits move LEFT **2** spaces
X 1000 digits move LEFT **3** spaces

Dividing

÷ 10 digits move RIGHT **1** space
÷ 100 digits move RIGHT **2** spaces
÷ 1000 digits move RIGHT **3** spaces

Multiply using the distributive law

e.g. 3 x 24 =

3 (20 + 4)

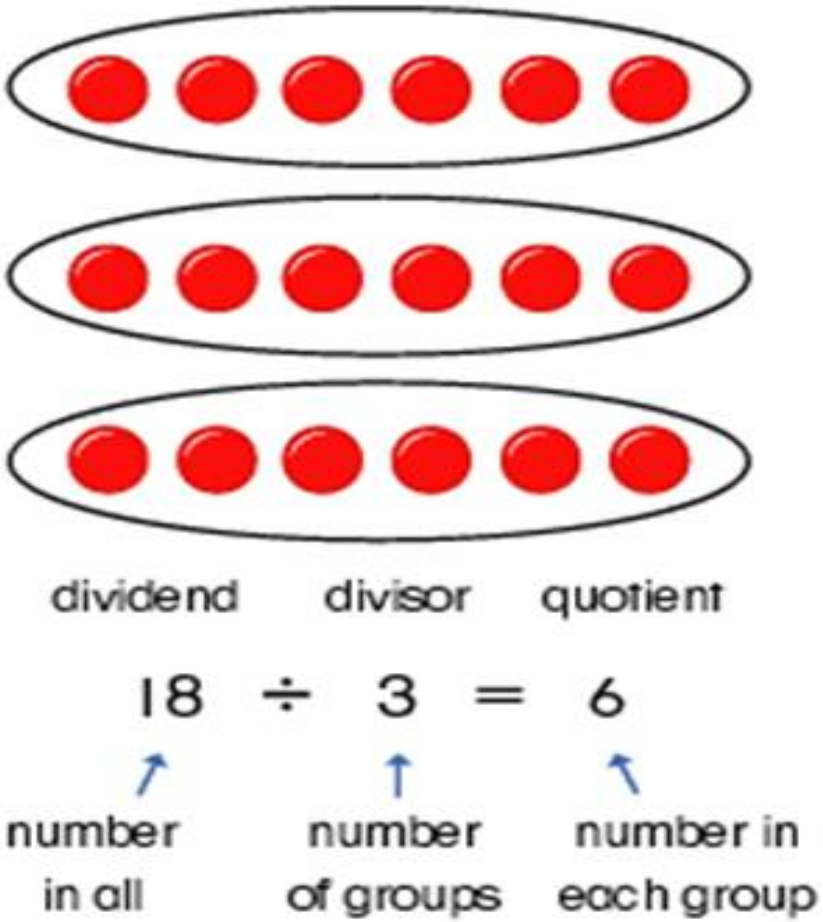
3 x 20 + 3 x 4 =

60 + 12 = 72

- https://www.khanacademy.org/math/arithmetic/arith-review-multiply-divide/arith-review-place-value-area-models/v/2-digit-multiplication-with-grid

Division

Division with arrays



Division - **Divide numbers up to 4 digits by a two –digit number, including with remainders as whole numbers or fractions.**

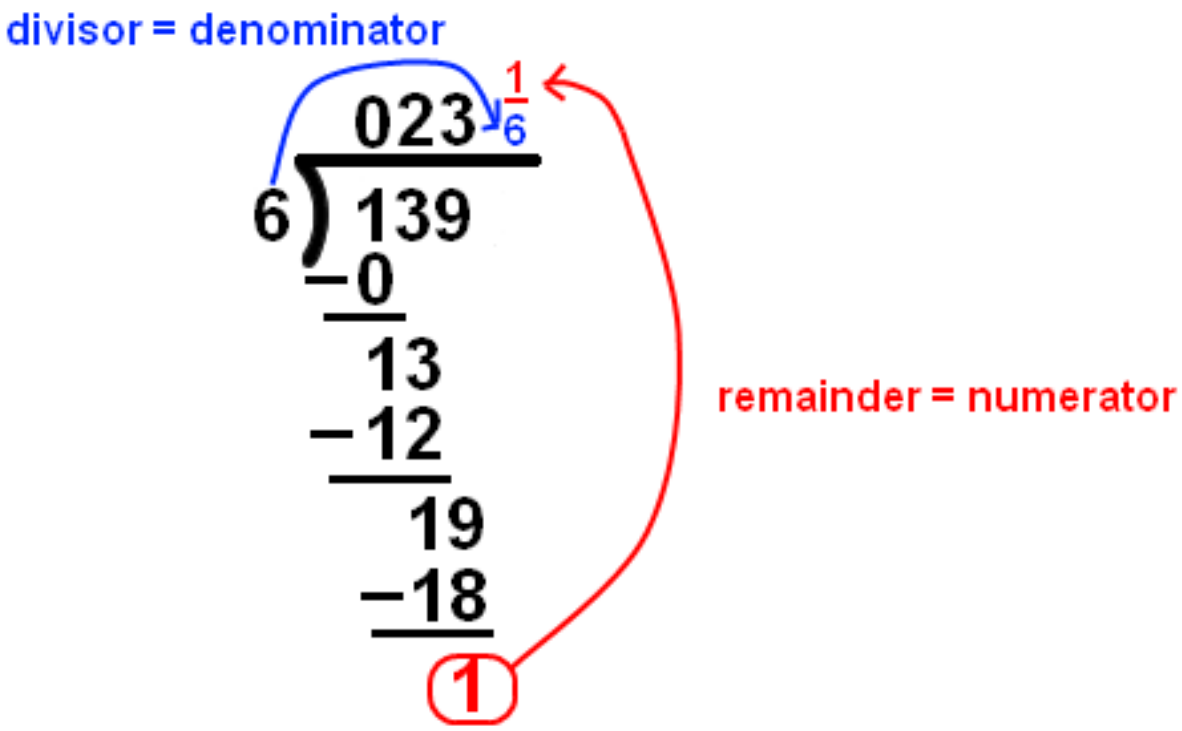
Long Division

```
  1483 r 1
4)5933
 -4
  19
 -16
   33
  -32
    13
   -12
     1
```

Short Division

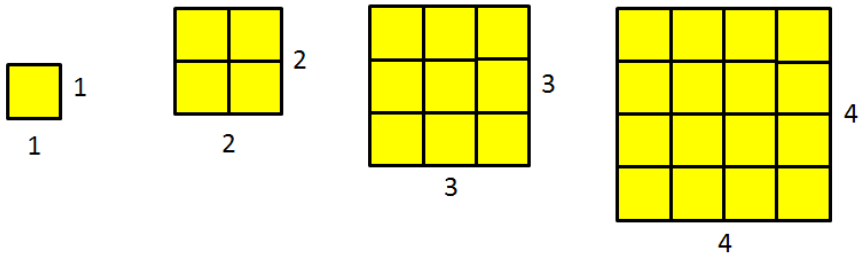
```
   36
7)2542
```

Divide numbers up to 4 digits by a two – digit number, including with remainders as whole numbers or fractions.



Square numbers

Square Numbers



1 x 1 = 1 2 x 2 = 4 3 x 3 = 9 4 x 4 = 16

Square Numbers: a number multiplied by itself

1 Squared = 1^2 = 1 × 1 = **1**

2 Squared = 2^2 = 2 × 2 = **4**

3 Squared = 3^2 = 3 × 3 = **9**

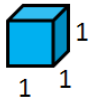
4 Squared = 4^2 = 4 × 4 = **16**

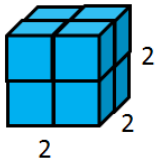
5 Squared = 5^2 = 5 × 5 = **25**

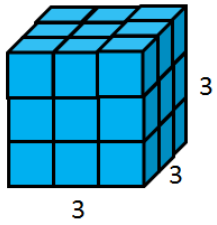
6 Squared = 6^2 = 6 × 6 = **36**

Cube numbers

Cube Numbers







1 x 1 x 1 = 1

2 x 2 x 2 = 8

3 x 3 x 3 = 27

Cube Numbers: a number multiplied by itself three times

$1^3 = 1 \times 1 \times 1 = 1$

$2^3 = 2 \times 2 \times 2 = 8$

$3^3 = 3 \times 3 \times 3 = 27$

$4^3 = 4 \times 4 \times 4 = 64$

$5^3 = 5 \times 5 \times 5 = 125$

$6^3 = 6 \times 6 \times 6 = 216$

$7^3 = 7 \times 7 \times 7 = 343$

$8^3 = 8 \times 8 \times 8 = 512$

$9^3 = 9 \times 9 \times 9 = 729$

$10^3 = 10 \times 10 \times 10 = 1000$

Any Questions?