



# Math Flaps: **Division**

Patent Pending

Teaching Guide



*A comprehensive guide that demonstrates how to use Math Flaps: Division to teach division, multiplication, addition, subtraction, factoring, odds & evens, set theory, and units.*



Spark Your Imagination



# Math Flaps: Division

## What can you do with Math Flaps: Division

*Math Flaps: Division* was designed specifically to teach the mathematic operation of division. However, it can also teach the operations of addition, subtraction & multiplication. Additionally, *Math Flaps: Division* can be used to teach about factoring, odd and even numbers, negative numbers, sets, and units.

### Dividing with Math Flaps: Division

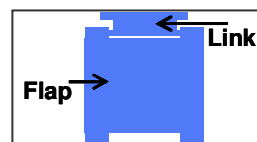
#### **Definition of terms:**

Dividend: The number being divided  
Divisor: The number that will divide the dividend  
Quotient: The result of the division (the answer)

#### **Example:**

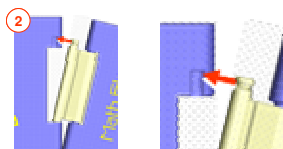
In the expression:  $6 \div 2 = 3$ ; the dividend is 6, the divisor is 2 and the quotient is 3.

*Math Flaps: Division* consists of a set of "math-flaps" that can be connected together to make any number. A standard package contains 100 math-flaps. To divide larger numbers, multiple packages can be combined. The math-flaps have two permanently connected parts, the flap and the link.

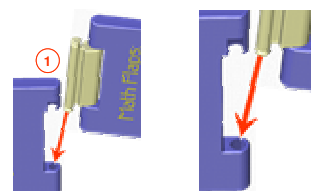


To create a number the links are slid into the flaps, as shown below.

1. Insert either post on the link into the hole in the flap



2. Snap the link's other post into the slot on the same flap



The connection made between the math-flaps allows them to rotate freely.

For example the number four is represented by four math-flaps connected together and forty-seven is represented by 47 math-flaps connected together.

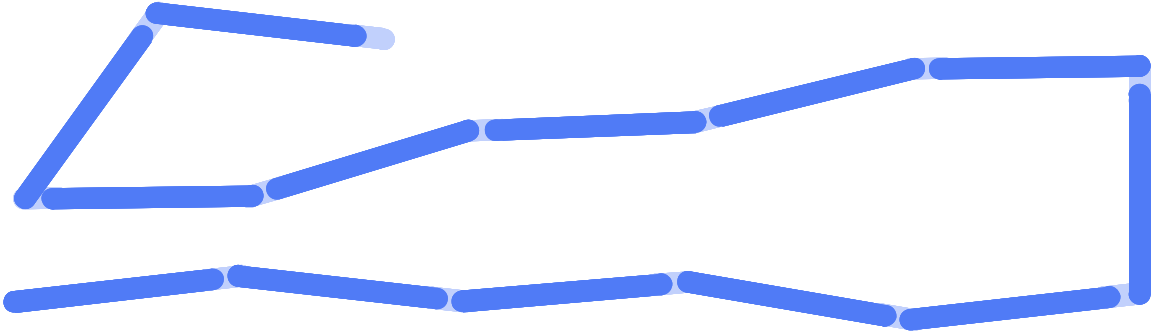


# Math Flaps: Division

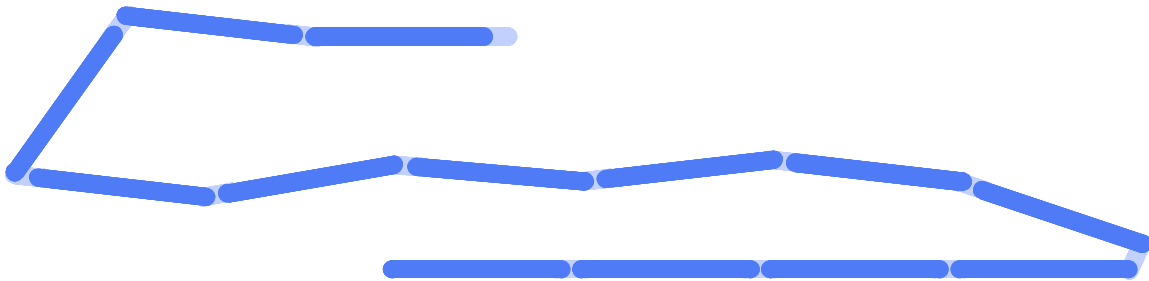
Here are the detailed steps to divide using *Math Flaps: Division*

The equation  $13 \div 4 = ?$  is solved as follows:

1. Take 13 math-flaps and connect them together



2. Place the math-flaps in a line, flat on a table, from one end count 4 math-flaps (four because the divisor is 4). Leave the four math-flaps on the table and fold over the remaining math-flaps (math-flaps 5 through 13) so that they overlap with the first.

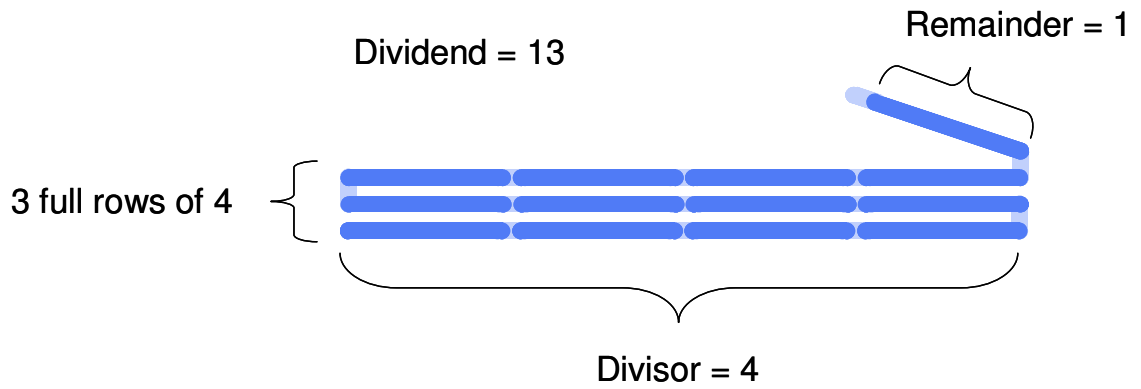


Repeat the fold over procedure creating 4 "stacks" of math-flaps. The four stacks represent the divisor in the equation.



3. As the math-flaps are folded over there are two possible outcomes. Either all the stacks will be the same height or they will not. In the case of  $13 \div 4$  three stacks have a final height of three math-flaps with one math-flap left over [they don't make a complete row of 4 (the divisor)]. The quotient (or answer) is the height of the even stacks, in this case: 3, plus the one extra math-flap which represents the remainder equal to 1, see the diagram below.

# Math Flaps: Division



4. The result of the operation  $13 \div 4$  is 3 with a remainder of 1, or stated another way: 3 and one-fourth, or  $3\frac{1}{4}$  or 3.25

# Math Flaps: Division

## Subtracting with Math Flaps: Division

### Definition of terms:

Minuend: The number from which another number is subtracted

Subtrahend: The number subtracted from another number

Difference: The result of the numbers subtracted (the answer)

### Example:

In the expression:  $6 - 2 = 4$ ; the minuend is 6, the subtrahend is 2 and the difference is 4.

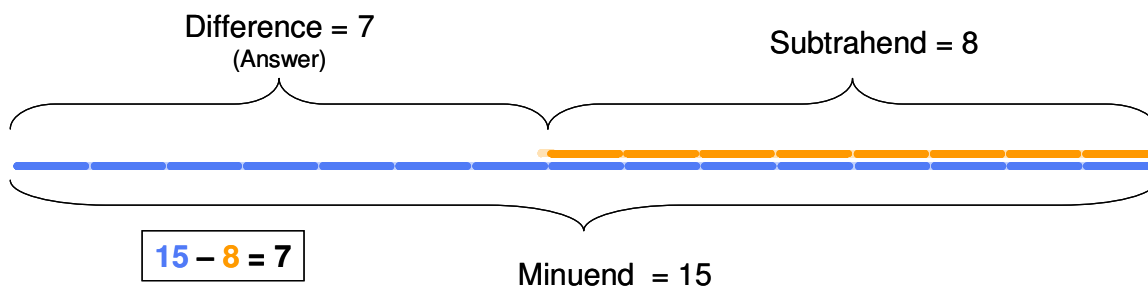
Subtracting, taking away, is very easy to manipulate with Math Flaps: Division. An additional advantage to using Math Flaps: Division is that it is also a good tool for introducing negative numbers, as will be seen later.

Take the problem  $15 - 8 = ?$  for example.

1. Connect 15 math-flaps together, all in one color, to create the number 15 (the minuend).
2. Connect 8 math-flaps together, all in a different color than the 15, to create the number 8 (the subtrahend).
3. Connect the two groups together and lay them flat on a table so the group of 8 is on the right.



4. Fold the group of 8 (subtrahend) over toward the left, over the minuend (15).
5. Starting at the left, count the math-flaps, one at a time until you get to the second row (or second color). That number will be the difference (the answer).



6. This strategy also works if the result is negative. Should the subtrahend be greater than the minuend then count the math-flaps that extend past (to the left of) the minuend. For example, try  $5 - 8 = ?$ .
7. Connect 5 blue math-flaps to 8 orange math-flaps.

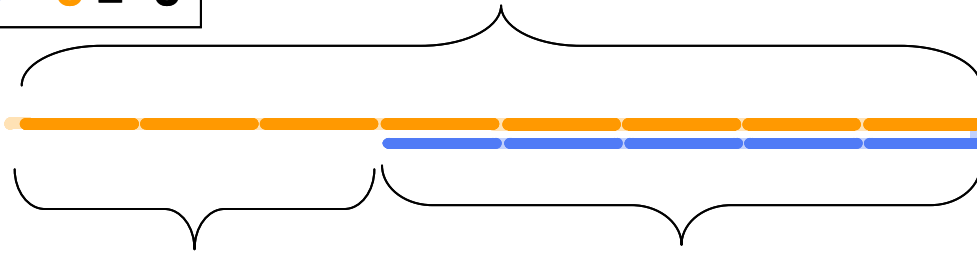
# Math Flaps: Division



8. Fold the (8) orange math-flaps over the (5) blue math-flaps.

$$5 - 8 = -3$$

Subtrahend = 8



Difference = -3  
(Answer)

Minuend = 5

# Math Flaps: Division

## Adding with Math Flaps: Division

### Definition of terms:

Addend: A number being added

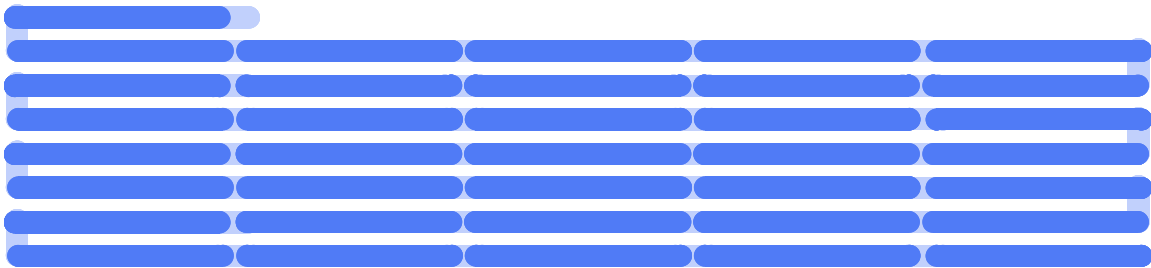
Sum: The result of the numbers being added (the answer)

### Example:

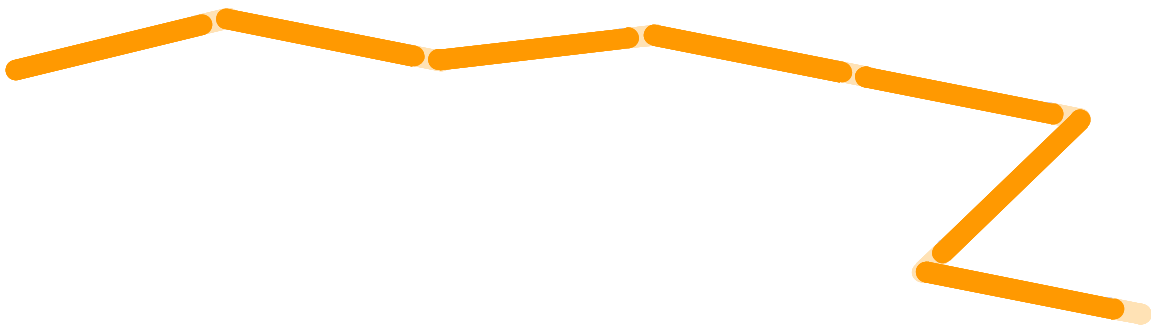
In the expression:  $6 + 2 = 8$ ; the addends are 6 & 2, and the sum is 8.

Adding is a very straight forward operation to demonstrate with Math Flaps: Division. It is easily explained with an example. Take  $36 + 7 = ?$

1. Connect 36 math-flaps together to create the number 36.

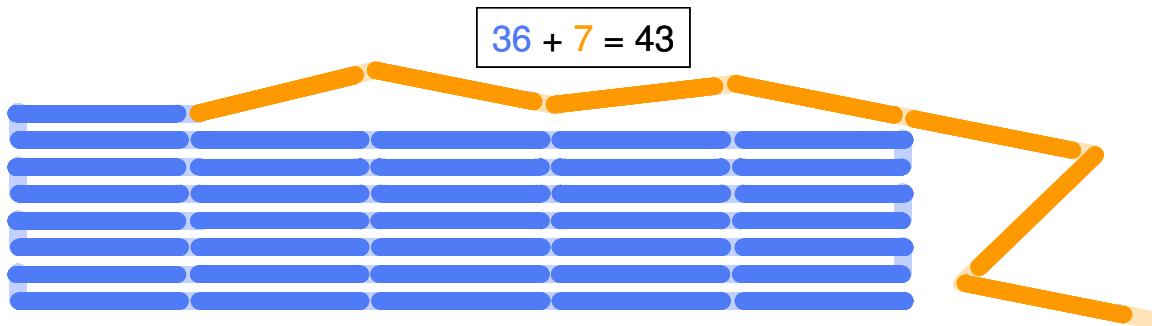


2. In a separate group connect 7 math-flaps together. In adding, the colors need not be segregated; however, as we will see, there are some advantages to using different colors for the different addends.



3. Connect the 36 to the 7 and count the total number of math-flaps.

# Math Flaps: Division



4. An alternative way of visualizing the sum and understanding the commutative property is to create ten stacks (as you would for division). Organizing the math-flaps in groups of ten will demonstrate that the answer equivalent to  $10 + 10 + 10 + 10 + 3 = 43$ .



5. Students can develop their own color schemes that help them see the patterns.



# Math Flaps: Division

## Multiplying with Math Flaps: Division

### Definition of terms:

Multiplier: A number being that multiplied by another (the multiplicand)

Multiplicand: A number being that multiplied by another (the multiplier)

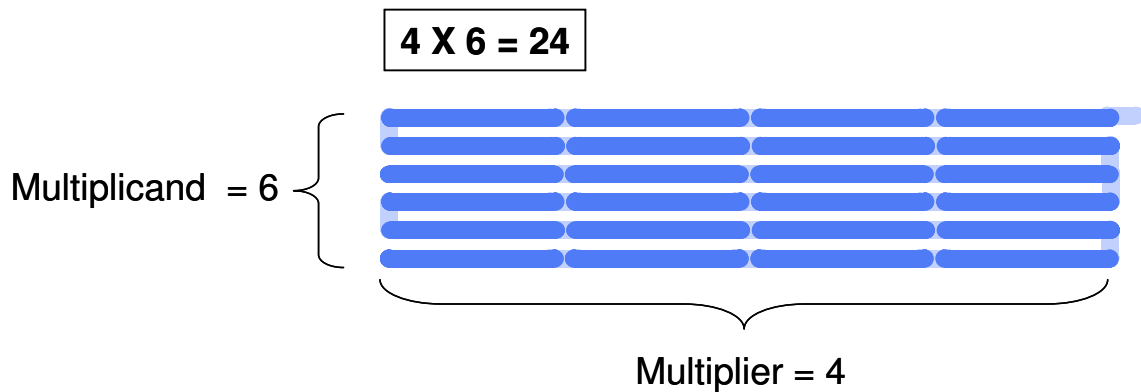
Product: The result of the numbers being multiplied (the answer)

### Example:

In the expression:  $6 \times 2 = 12$ ; the multiplier is 6, the multiplicand is 2, and the product is 12.

Multiplying is very similar to addition. Take the problem  $4 \times 6 = ?$  for example.

1. Connect 4 (multiplier) math-flaps together. Repeat five more times so you have six (multiplicand) groups in all.
2. Connect the six groups together, one at a time laying the latest group of math-flaps on top of the previous group.
3. When this is complete, count all the math-flaps, the result will be the product.



As with addition the math-flaps can be re-organized to show different equations with the same product, like  $2 \times 12$  or  $3 \times 8$  or  $6 \times 4$ .

# Math Flaps: Division

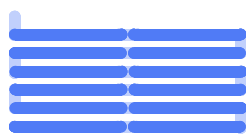
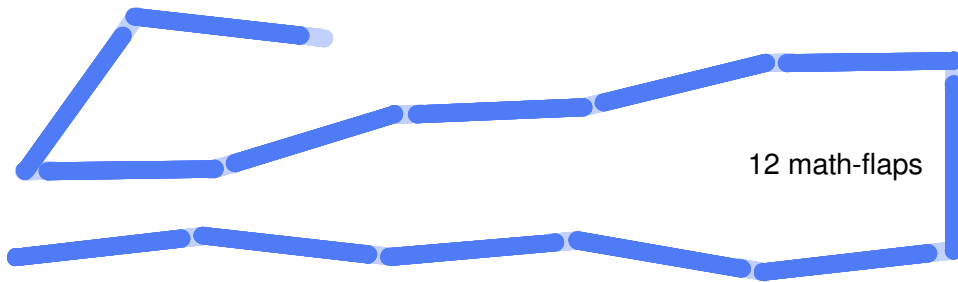
## Factoring with Math Flaps: Division

Finding factors with Math Flaps: Division is both easy and fast. Finding factors of a number is just division with series of different divisor.

To find the factors of a number, first you must connect the appropriate number of math-flaps together to create the number, say 12. Next you divide the dividend (12) by the set of numbers that are smaller than it and equal or less than half the dividend, in this case 6 (i.e. 2, 3, 4, 5, 6)

The factors will be the divisors that divide evenly into the dividend, in other words there is no remainder. In the case of 12 the factors are 2, 3, 4 & 6.

### Using Math Flaps: Division to find the factors of 12



$$12 \div 2 = 6 \rightarrow$$

2 is a factor of 12



$$12 \div 3 = 4 \rightarrow$$

3 is a factor of 12



$$12 \div 4 = 3 \rightarrow$$

4 is a factor of 12



$$12 \div 5 = 2 \text{ r } 2 \rightarrow$$

5 is not a factor of 12



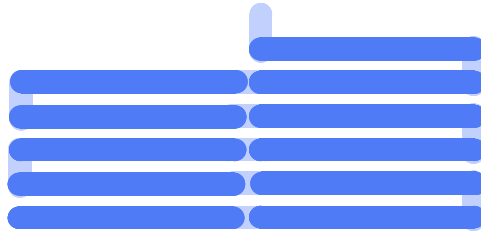
$$12 \div 6 = 2 \rightarrow$$

6 is a factor of 12

# Math Flaps: Division

## Odd and Even Numbers

*It can be determined whether a number is odd or even with Math Flaps: Division. Simply, put together the appropriate number of math-flaps, say 13. Then create two stacks like you would when dividing by two.*

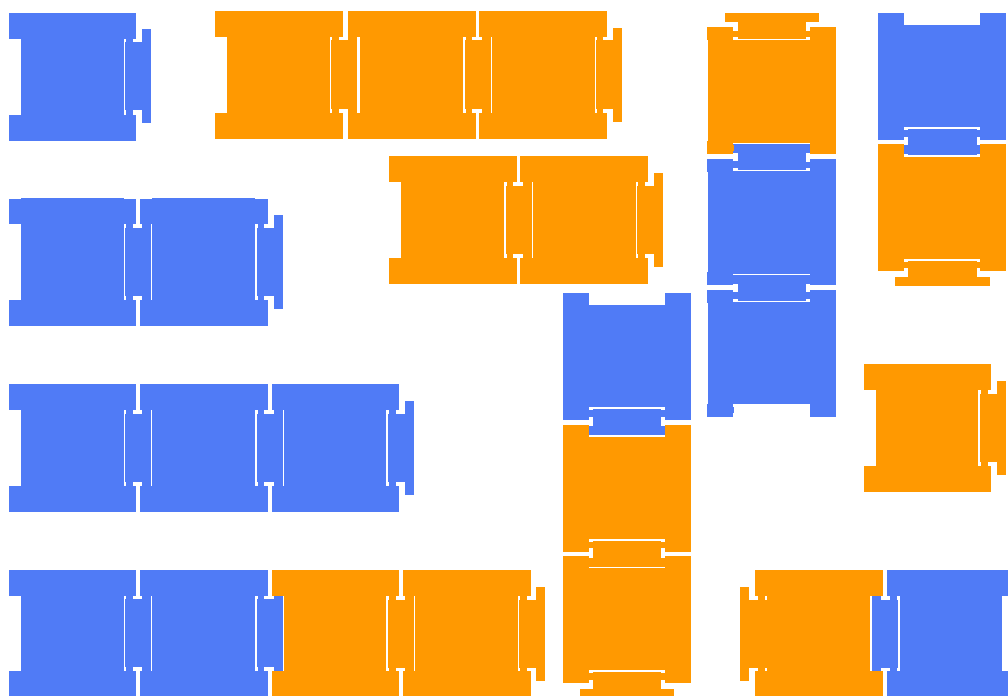


*If the two stacks are the same height then the number is even, if not (like 13) the number is odd.*

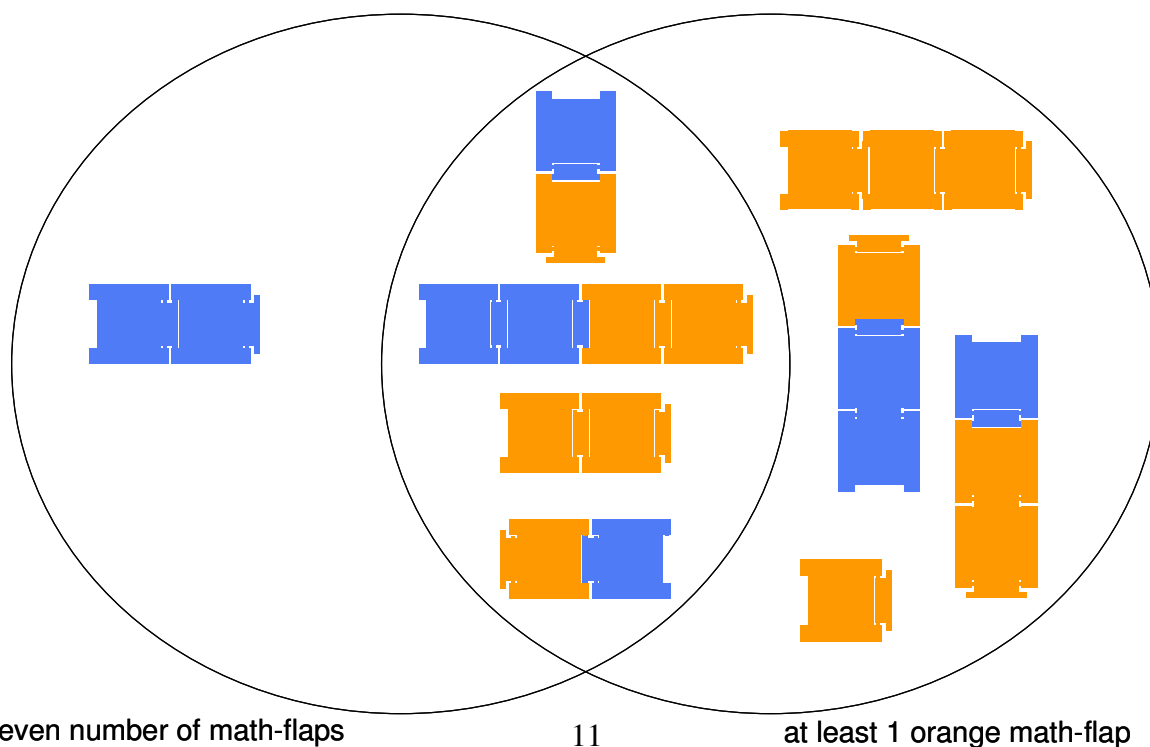
# Math Flaps: Division

## Sets

*Math Flaps: Division can be used to teach the concept of sets in the following way: Combinations of math-flaps are put together using a variety of different colors and in a variety of different, for example:*



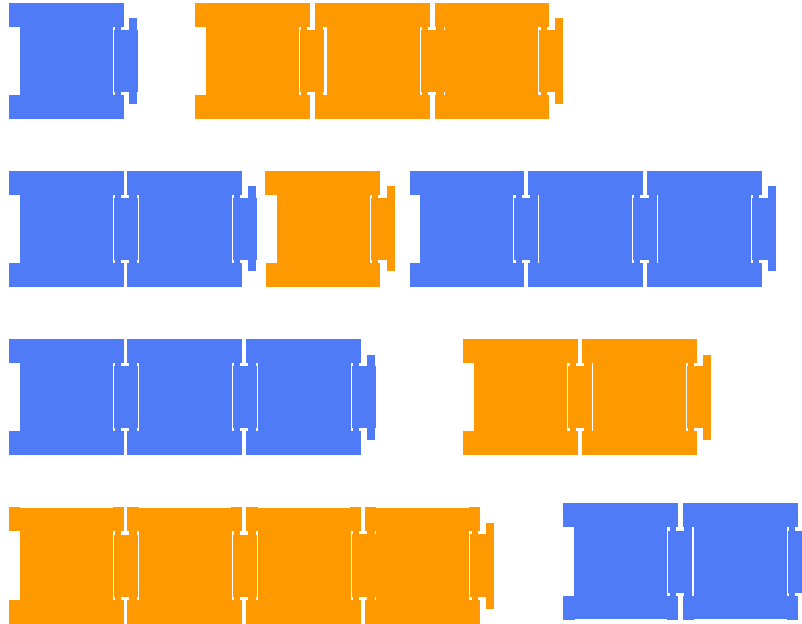
*Two (or more) rules are defined and the math-flaps are grouped accordingly. For example:*



# Math Flaps: Division

## Units

Units can be taught with Math Flaps: Division by using the two different colors. In this exercise the teacher creates several groups of math-flaps of various sizes. Each group should be all of one color or the other. For Example:



The student is told to add together only math-flaps of a certain color, say orange. One at a time the teacher hands the students a group of math-flaps of varying colors. The student should only add the specified colors together. For Example:

Addend	Current Sum
	 Result = 5 orange math-flaps