



Math



Understand the contents

We are glad to present to you **Gimnasio virtual San Francisco Javier**. Present it presented through texts for elementary education program and the sequence mathematically oriented contents, enriched by videos and subtopics.

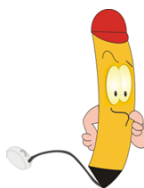
Handle this text thoughtfully to acquire new attitudes, skills, abilities and concepts which will allow you to expand your worldview.

Contents are grouped into four units containing four sessions of topics and subtopics consisting of several pages. Each topic begins with a title, a series of questions whose purpose is to inspire your interest in studying the topics. You can use these questions at the end to make a self check, how much do you know now.

You'll find images related to the concepts and themes, videos, charts, concept maps to ensure that you understand the logic behind concepts.

The funny helpers are there to support you in your journey through this adventure of knowledge.

Let us search...



When you find this pencil, you will know that there were many questions without answers. You can use them at the end of a topic to find what you have learned.



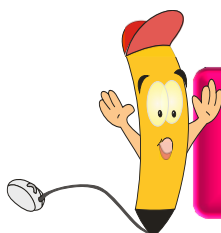
When you find this helper, you have to carry out the activities for each topic or subtopic.



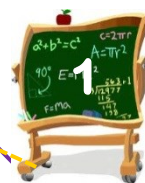
Art is a part of your activities, giving a personal touch making it in color. Now you are the artist!



Teacher helper invites you to learn more about the topic, to study new things. It is becoming very interesting to know!



Did you know that...?
You'll find fun facts that invite you to learn more about other related topics.





Numbers up to 9'999

A four-digit number can be decomposed into: units of thousands, hundreds, tens and units.

One unit is equal to one thousand units.

$$1TU = 1'000 U$$

8	'	3	4	9	=	8 TU	3 C	4 T	9 U
---	---	---	---	---	---	------	-----	-----	-----

8	'	3	4	9	=	8000	300	40	9
---	---	---	---	---	---	------	-----	----	---

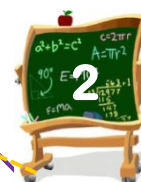


1. Connect corresponding cards with lines

Two thousand	Six thousand	Nine thousand	Four thousand	Five thousand
--------------	--------------	---------------	---------------	---------------

6.000	4.000	2.000	5.000	9.000
-------	-------	-------	-------	-------

9 thousand units	4 thousand units	Five thousand units	Six thousand units	Two thousand units
------------------	------------------	---------------------	--------------------	--------------------





2. Write the decomposition of each number

Number	TU	C	T	U
3'587=				
4'803=				
6'798=				
1'975=				
2'012=				

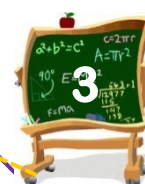
Numbers up to 99'999

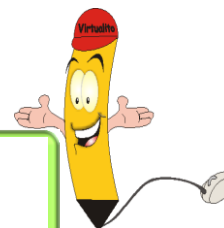
A five-digit number can be decomposed into: Tens of thousand, units of thousands, hundreds, tens and units.

3	8	'	3	4	9	=	3 TT	8 TU	3 C	4 T	9U
---	---	---	---	---	---	---	------	------	-----	-----	----

3	8	'	3	4	9	=	30'000	8'000	300	40	9
---	---	---	---	---	---	---	--------	-------	-----	----	---

It reads thirty-eight thousand three hundred forty-nine





Activity

1. Write the decomposition of each number:

Digit	TT	TU	C	T	U
85'729=					
46'318=					
64'788=					
11'975=					
61'409=					

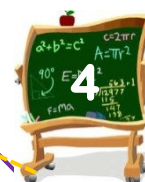
2. Color the numbers in the table according to the key:

In **red** numbers where the 8 is worth 800.
 In **green** numbers where the 5 is worth 5'000
 In **purple** numbers where the 3 is worth 30'000
 In **blue** numbers with 6 units.

Which number was not colored?

What digit of this number occupies the tens of thousands position?

37.609	55.006	95.405	31.318
25.307	41.835	65.003	45.739
77.804	43.059	33.447	10.006
34.150	55.315	96.801	36.523
17.463	48.166	85.980	70.800
91.906	65.602	28.892	30.235
70.809	69.576	85.407	39.004





Numbers up to 999'999

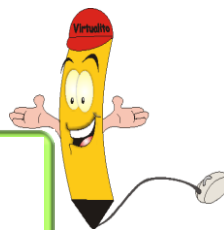
A six-digit number can be decomposed into: Hundreds of thousands, tens of thousand, units of thousands, hundreds, tens and units.

9	3	8	,	3	4	9	=	9 HT	3 TT	8 TU	3 C	4 D	9 U
---	---	---	---	---	---	---	---	------	------	------	-----	-----	-----

9	3	8	,	3	4	9	=	900'000	30'000	8'000	300	40	9
---	---	---	---	---	---	---	---	---------	--------	-------	-----	----	---

It reads nine hundred and thirty-eight thousand three hundred forty-nine.

Activity



1. Underline numbers possessing indicated property.

Numbers with a digit in indicated position

600'000

437'648
691'001
560'003
629'482

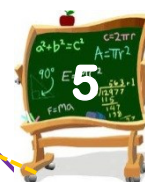
Digit 9 in TU position

799'839
497'648
509'316
815'945

Numbers with a digit in indicated position is

800

563'804
937'508
800'037
809'892





2. Construct if it is possible larger and smaller number only using digits of the given number.

534'817

Greater	Less

302'694

Greater	Less

735'562

Greater	Less

657'980

Greater	Less

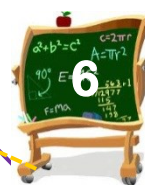
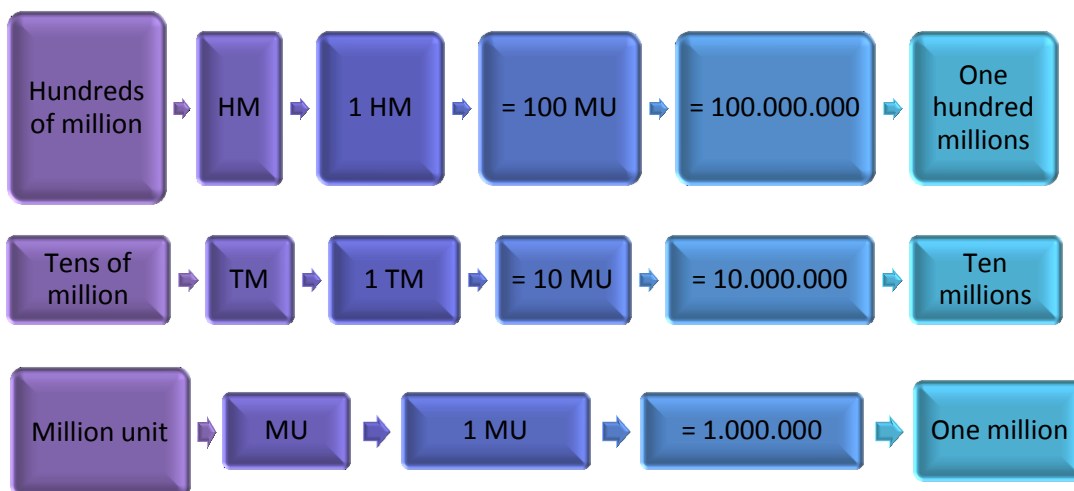
987'345

Greater	Less

234'988

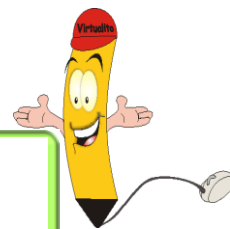
Greater	Less

Millions





Activity



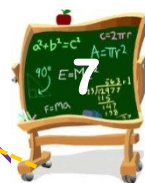
1. Read the text and complete.

Two siblings Mike and Sandra are watching movie about space. Sometimes Sandra does not understand the film , since she can not read numbers having more then six digits, like distances between planets, stars and galaxies. To help her, Mike writes these numbers to read and explain them later.



Write down the numbers that Mike copied during the film.

2'935'321	
14'832'121	
57'780'875	
21'346'892	
250'435'204	
142'790'347	
679'983'072	





Roman numbers

The ancient Romans used seven letters and four rules to write numbers. Each letter has a value. Look at the table:

I = 1
V = 5
X = 10
L = 50
C = 100
D = 500
M = 1000



- A letter written to the right of another letter with equal or greater value, adds to this value.
- CC = 100 + 100 = 200
- VI = 5 + 1 = 6
- DC = 500 + 100 = 600

Addition rule



- A letter written to the left of another letter with greater value, is subtracted from this value.
- IX = 10 - 1 = 9
- CD = 500 - 100 = 400

Subtraction rule



- Letters I, X, C, M, can be written only two or three times.
- CCCC - Wrong
- CD - Correct
- Letters V, L, D, can not be written twice
- VV=X, LL = C, DD=M

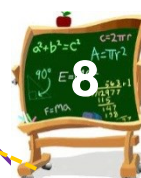
Repeating rule



- If a letter or group of letters has a line above, it means that its value is multiplied a thousandfold.

- $\overline{\text{V}}$
- $\overline{\text{VIII}} = 7 \times 1'000 = 7,000$

Multiplication rule



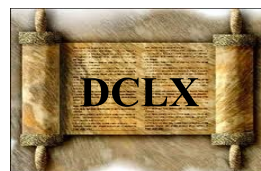
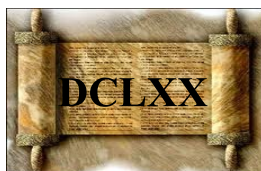
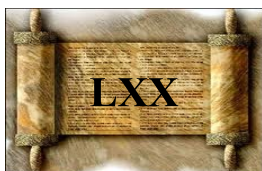
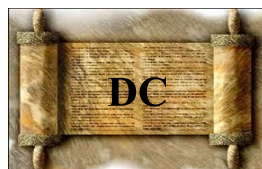
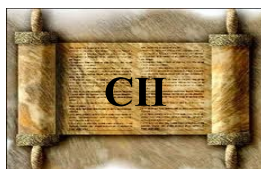


Activity

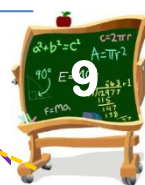
1. Indicate decimal number corresponding to the Roman number on the left.

MCCCVIII	138	1'308	10'308
CDXL	404	4'040	440
DCLXXV	675	4'525	457
MXXVI	1'206	1'260	1'026
MMCCXL	2'290	2'240	2'260

2. An treasure hunter found several papyri belonging to ancient civilization. To decrypt his map the only clue he has is to sort them in historical order.



Sort the papyri from the oldest to newest.





Addition and subtraction

Now test your knowledge.

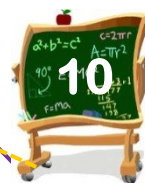
1. A regular jet plane reaches a speed of 925 km per hour. The Concorde plane can fly at 2150 kilometers per hour. What advantage will have Concorde over a regular jet in an hour?



2. I bought 50 pounds of potatoes, 30 pounds of cassava, 12 pounds of carrots, 27 pounds of fruit and 35 pounds of grain. How many pounds I have bought?



3. A person turns 43 years in 1998. He made his first communion at age of 11 and married at age 20. When he was born? In which year he had first communion? What was the year of marriage?

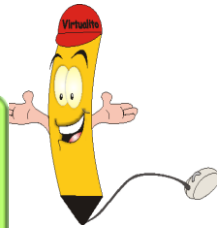




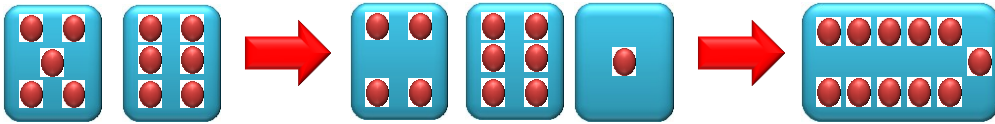
Adding or summation



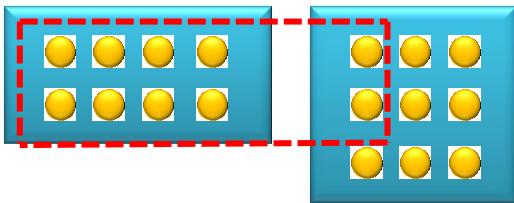
Activity



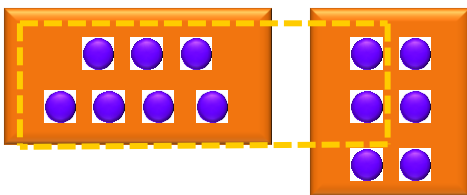
1. Finish summation.



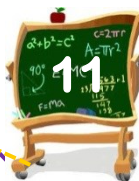
$$6 + 5 = 6 + (4 + 1) = (6 + 4) + 1 = 10 + 1 = 11$$

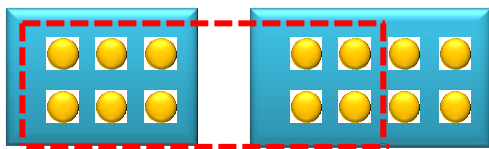
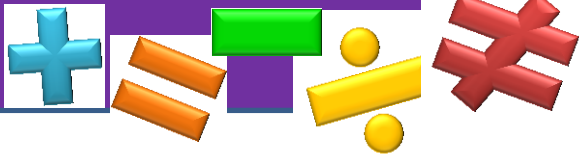


$$8 + 9 = 8 + (2 + 7) = (8 + 2) + 7 = 10 + 7 = 17$$



$$7 + 6 = 7 + (3 + 3) = (7 + 3) + 3 = 10 + 3 =$$





$$6 + \quad = 6 + (\quad + \quad) = (6 + \quad) + \quad = \quad + \quad = \boxed{\quad}$$

2. Beat the Calculator. Add numbers in your mind.

$2 + 8$

$3 + 7$

$9 + 4$

$6 + 6$

$8 + 8$

$4 + 7$

$5 + 4$

$7 + 2$

$6 + 2$

$7 + 7$

$1 + 8$

$5 + 8$

$9 + 4$

$4 + 8$

$6 + 9$

$8 + 6$

$5 + 7$

$8 + 5$

3. Read, analyse and write down corresponding arithmetical expression. Calculate the result:

a. We had a walk and met meet 7 men and 9 women.

How many people we saw?

b. During a short hike I gathered 8 carnations and 7 poppies.

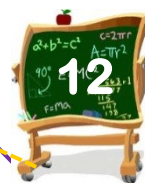
How many flowers are in my hand?

c. I bought 6 oranges and 5 pineapples at a small farmers market.

How many fruits did I get?

d. A neighbouring pet shop had 4 cats and 8 dogs for sale.

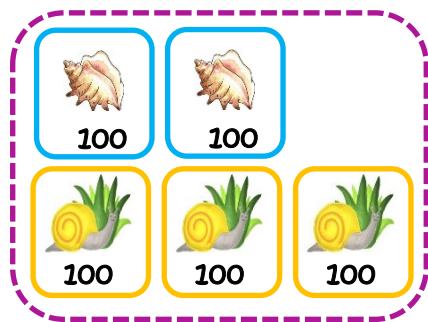
How many animals they had for sale?



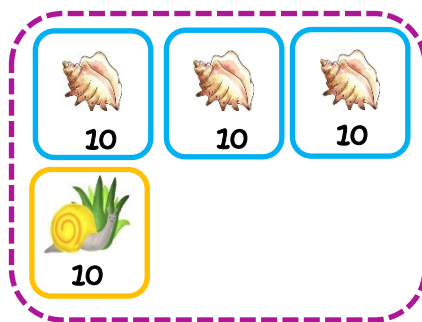


Addition with three-digit numbers

Andres is a collector. He has 234 shells and 312 snails! What is the total of his collection?



5 hundred



4 tens



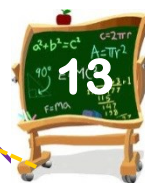
6 units

$$\begin{aligned}
 234 + 312 &= (200 + 30 + 4) + (300 + 10 + 2) \\
 &= (200 + 300) + (30 + 10) + (4 + 2) \\
 &= 500 + 40 + 6
 \end{aligned}$$



Hundreds	Tens	Units
2	3	4
3	1	2
5	4	6
2 + 3	3 + 1	4 + 2

To make summation easier, deal with numbers at each position separately. Add units with units, tens with tens and hundreds with hundreds.

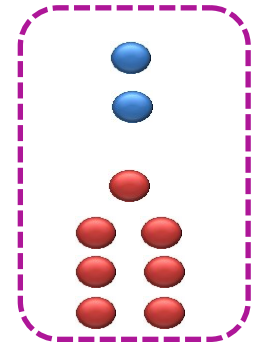
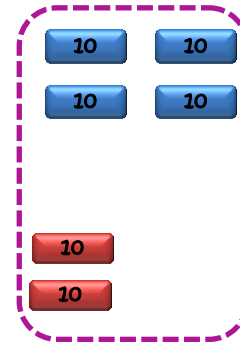
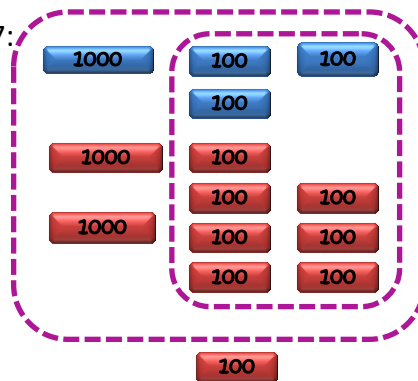




Addition grouping tens of thousand units

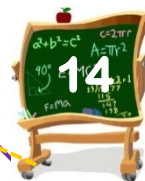


1. Add 1'342 and 2'827:



Thousand units	Hundreds	Tens	Units
①			
1	3	4	2
2	8	2	7
4	1	6	9
1 + 1 + 2	3 + 8 = 11	4 + 2	2 + 7

$$\begin{aligned}
 1\ 342 + 2\ 827 &= (1000 + 300 + 40 + 2) + (2000 + 800 + 20 + 7) \\
 &= (1000 + 2000) + (300 + 800) + (40 + 20) + (2 + 7) \\
 &= 3000 + 1100 + 60 + 9 \\
 &= 3000 + 1000 + 100 + 60 + 9 \\
 &= (3000 + 1000) + 100 + 60 + 9 \\
 &= 4000 + 100 + 60 + 9
 \end{aligned}$$





Activity



1. Calculate the following sums.

$$\begin{array}{r} 4\ 2\ 9\ 3 \\ +\ 3\ 1\ 4\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 2\ 1\ 0\ 3 \\ +\ 5\ 4\ 3\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} 3\ 9\ 1\ 6 \\ +\ 4\ 5\ 8\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 3\ 8\ 8\ 9 \\ +\ 3\ 2\ 9\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 3\ 6\ 5\ 4 \\ +\ 2\ 3\ 4\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 7\ 8\ 5\ 6 \\ +\ 6\ 3\ 1\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 3\ 6\ 3\ 3 \\ +\ 5\ 8\ 7\ 3 \\ \hline \end{array}$$

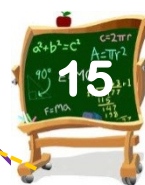
$$\begin{array}{r} 6\ 8\ 5\ 9 \\ +\ 2\ 2\ 5\ 8 \\ \hline \end{array}$$

2. Some numbers in these sums are absent. Recover them:

$$\begin{array}{r} 2\ 4 \\ +\ 3\ 2\ 3\ 1 \\ \hline 5\ 7\ 2\ 5 \end{array}$$

$$\begin{array}{r} 1\ 7\ 5 \\ +\ 3\ 6 \\ \hline 9\ 4\ 3 \end{array}$$

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





Problems

The sales of Simon's store have been declining recently. Yesterday he sold \$5349 and today only \$3587. How much money got Simon in two days?

Read the text:

Gather known data :

Identify the question:

What does it mean?:

Proceed

Give an answer

The statement of the problem to distinguish the data and question.

Sales	Yesterday,	5 349 pesos
	Today	3 587 pesos

How much money in two days?

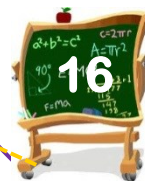
Sales of yesterday plus today's will give us the total.

5 3 4 9 → Yesterday sales

+ 3 5 8 7 → Sales today

8 9 3 6 → Sales for two days

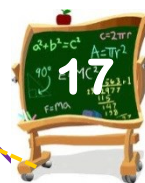
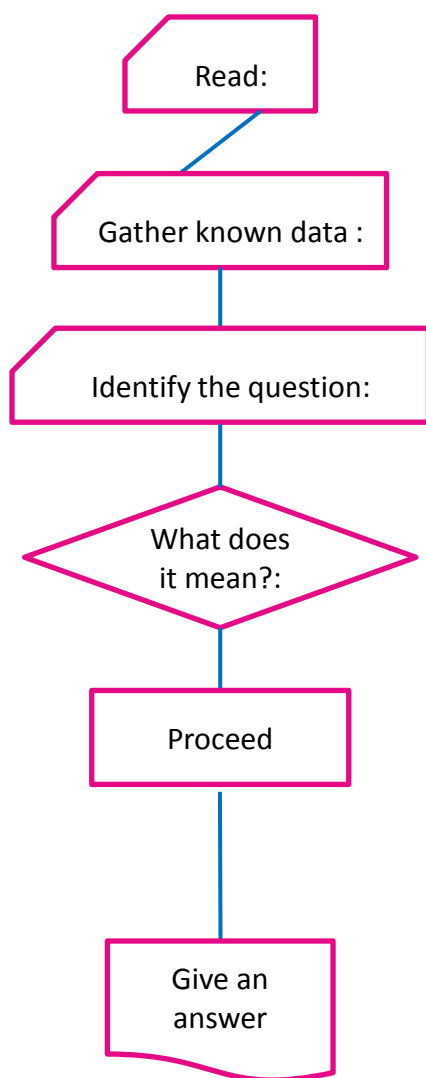
Mr. Simon raised \$8936 during two days.





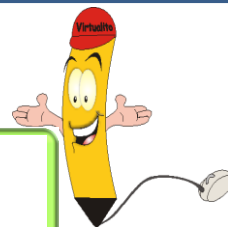
Now it's your turn ...

At the end of season the local football championship its events were attended by 7539 men and 5937 women. How many people visited matches?





Activity



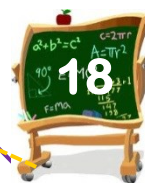
1. Read the problem. Fill table with data and give answers. Our local drama theater has three floors. There are 315 seats at the second floor, 678 at the second and 579 at the third floor. For how many theatre-goers can enjoy the show together?

				Third Floor
+				Second Floor
				First Floor
<hr/>				

2. This weekend a show was attended by 734 children and 1245 adults. How many people attended?

				Children
+				Adults
<hr/>				

3. 2827 students enrolled The School of Arts. By expanding its facilities it may receive 928 students more. How many students can study now at School?

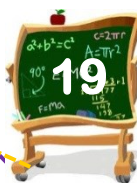
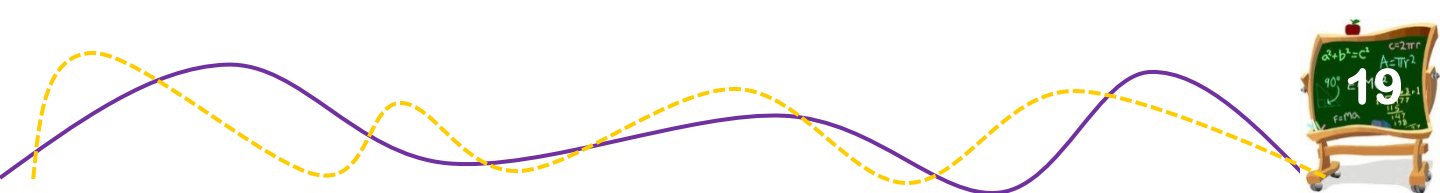




4. A garment factory finished an order for 324 meters of linen, 927 meters of cloth, 1350 meters of cotton and 763 meters of silk. Find the order total.

5. Carmen bought 1342 grams of beef stake, 2524 grams of chicken legs, 2467 grams of veal and 4657 grams of fish filet. How many grams of meat she bought?

6. The city newspaper sold 8976 of copies in the morning and 9765 in the afternoon. How many copies were printed today?





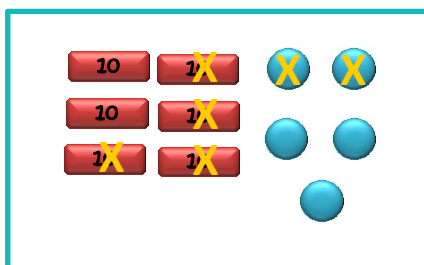
Subtraction of integer numbers

After correct subtraction, the sum of the difference and the subtrahend equals to the minuend.

	5 7 6 3 9	Minuend
—	5 2 1 5	Subtrahend
	5 2 4 2 4	Difference

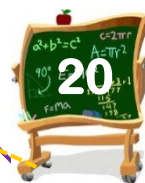
A vertical scheme helps us to find a difference by performing subtraction in order, starting from the right with units, then subtracting tens and so on.

Complete a vertical scheme for each subtraction.



	t	u
—	6	5
	4	2
	2	3

	t	u
—	7	2
	5	2



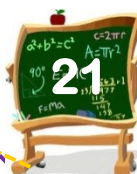


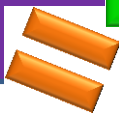
Subtraction of integer numbers

	t	u
-	5	7
	2	3

	t	u
-	9	8
	4	7

	t	u
-	6	4
	4	8





Relationship between addition and subtraction

Addition and subtraction are reciprocal arithmetic operations. It means that the result of subtraction we can check by addition, calculating the sum of the subtrahend and the difference. The result should be equal to the minuend.

$$\begin{array}{r}
 74639 \\
 - 2562 \\
 \hline
 72077
 \end{array}$$

$$\begin{array}{r}
 2562 \\
 + 72077 \\
 \hline
 74639
 \end{array}$$

Proof

Now practice...

$$\begin{array}{r}
 54259 \\
 - 37562 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 + \\
 \hline
 \end{array}$$

Proof

$$\begin{array}{r}
 64899 \\
 - 7443 \\
 \hline
 \end{array}$$

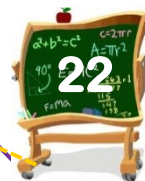
$$\begin{array}{r}
 + \\
 \hline
 \end{array}$$

Proof

$$\begin{array}{r}
 96773 \\
 - 2116 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 + \\
 \hline
 \end{array}$$

Proof





Properties

Commutative property

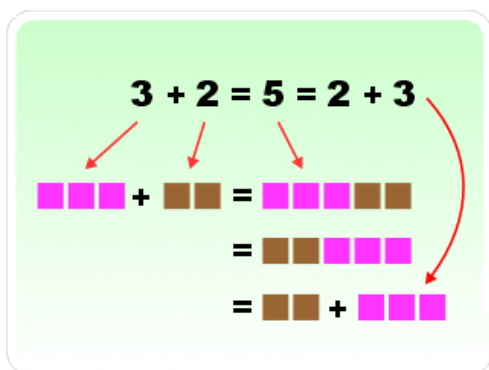
In summation changing the order of addends does not change the result.

Commutative property: <http://www.youtube.com/watch?v=sWSFczkBIHM>

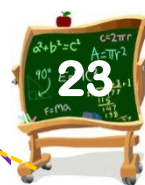
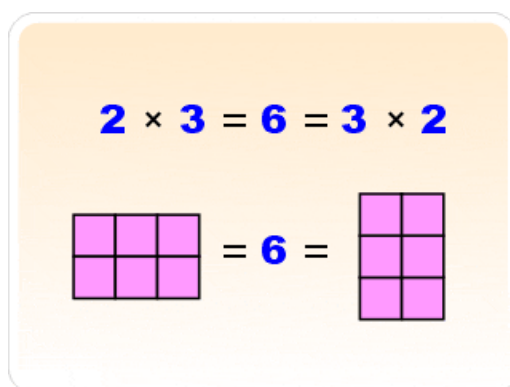
Example:

I can add 4'130 to 60 or 60 to 4'130 and result will the same, so the sum is commutative.

Example:



Multiplication also is commutative operation. It property means that factors can be multiplied in any order while the product is the same.





Natural numbers. Multiplication

Solve the examples of the problems.

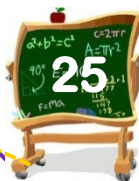
1. We bought three pices of brown sugar for 75 cents, 5 loaves for 30 cents each. If we had a 5 dollar bill, how much is left?



2. A hen lays in average 4 eggs weekly, and each egg sells for 12 cents. How much money we can get from 8 hens during 4 weeks?



3. Students have two hours and half to finish four knowledge tests. Each test takes about 30 minutes. How much time they can rest before starting the next test?





A multiplication is the sum of equal summands.

$$15 + 15 + 15 + 15 = 60$$

$$15 \times 3 = 45$$

The multiplication terms are called factors and an outcome is called product. Multiplication signs are (x) and (\cdot).

Multiplication properties

$$\begin{array}{r}
 \times \quad 14 \\
 \quad \quad 4 \\
 \hline
 60 \text{ product}
 \end{array}$$

Factors

Commutative: The order of the factors does not change the result.

$$8 \times 6 = 6 \times 8$$

$$48 = 48$$

Associative: Factors can be grouped in various ways without changing the result.

$$2 \times (6 \times 4) = (2 \times 6) \times 4$$

$$2 \times 24 = 12 \times 4$$

$$48 = 48$$

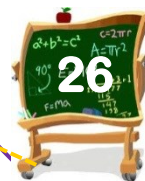
Distributive: The product of a number and a sum is equal to the sum of the products of all summands.

$$4 \times (8 + 3) = (4 \times 8) + (4 \times 3)$$

$$4 \times (11) = 32 + 12$$

$$44 = 44$$

Neutral element: is the number one (1), because multiplication by 1 gives the same number.





Multiplication by 10

Move the decimal point to the left to separate ending zero.

Example: 8×40 becomes 8×4

Proceed with multiplication ($8 \times 4 = 32$). Move the decimal point in the product to the right once: ($32 \times 10 = 320$).

Multiply two-digit numbers by one-digit numbers

Multiplying a two-digit number by a one digit number.

Example: 43×2

Place greater number above the smaller one so, that the digits of the units are aligned.
Draw a line under the bottom number

Multiply the digits of the units ($3 \times 2 = 6$). Place the six below the line in the ones column.

$$\begin{array}{r}
 43 \\
 \times 2 \\
 \hline
 6
 \end{array}$$

Multiply the digit in the tens column (4) by the digit in the units column of the second number (2). The result is $4 \times 2 = 8$. Place the answer below the line to the left of 6 aligned with tens.

$$\begin{array}{r}
 43 \\
 \times 2 \\
 \hline
 86
 \end{array}$$

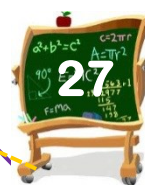
Now try it yourself...

$$\begin{array}{r}
 53 \\
 \times 4 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 69 \\
 \times 3 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 75 \\
 \times 2 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 44 \\
 \times 6 \\
 \hline
 \end{array}$$





Multiples of a number

Are the numbers we get when we multiply a given number by natural numbers.

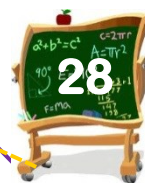
times	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

To obtain multiples of a number multiply the number by each natural number.

For example numbers **4, 8, 12, 16, 20, 24** are **multiples** of **4**.

It also means that **4** is a divisor of **4, 8, 12, 16, 20, 24, ...**

	x 1	x 2	x 3	x 4	x 5	x 6	x 7	x 8	x 9	x10
Multiples of 4	4	8	12	16	20	24	28	32	36	40
Multiples of 5	5	10	15	20	25	30	35	40	45	50
Multiples of 6	6	12	18	24	30	36	42	48	54	60
Multiples of 7	7	14	21	28	35	42	49	56	63	70

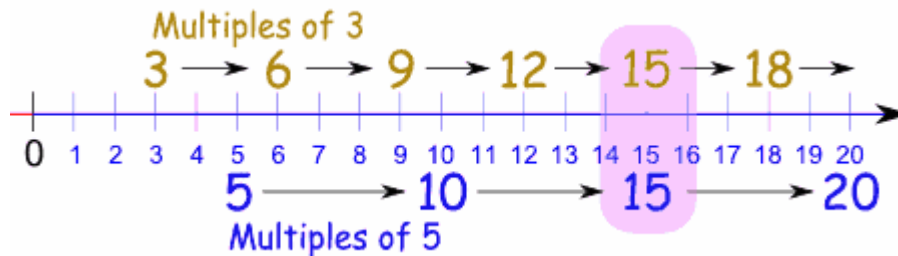




Least Common Multiple

To find the **common multiples** of various numbers, first write the multiples of each number and then look which numbers coincide.

The minimal (lowest) common multiple found is called the **least common multiple (LCM)**



Least common multiple also is known as a least common denominator when we talk about fractions.

$$\frac{4}{15} + \frac{5}{9} = \frac{37}{45}$$

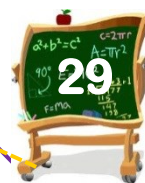
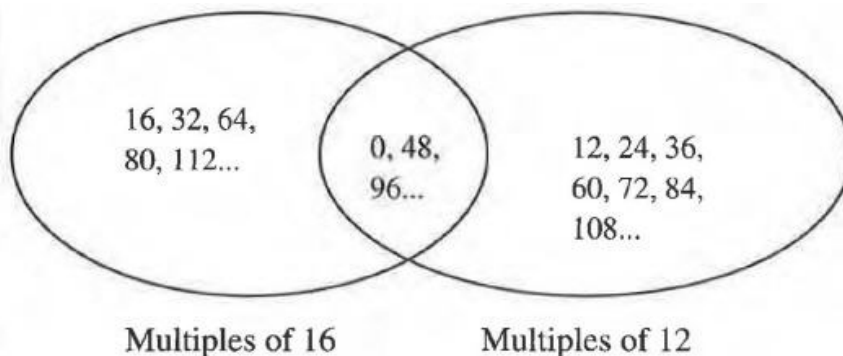
numerator

denominator

Least common number of the numbers **a** and **b** is a smallest number **LCM(a,b)** divisible by both **a** and **b**.

8: 8 16 **24** 32 40...

12: 12 **24** 36 48 60...





Properties of multiples

First property:

All multiples are multiples of itself and unity (1).

Note that any number can be expressed as the product of one by himself.

$$0 = 1 \times 0$$

$$1 = 1 \times 1$$

$$2 = 2 \times 1$$

$$5 = 5 \times 1$$

$$7 = 7 \times 1$$

Second property :

Zero (0) is a multiple of any natural number.

$$0 = 0 \times 3$$

$$0 = 0 \times 4$$

$$0 = 0 \times 5$$

$$0 = 0 \times 6$$

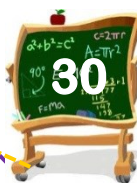
$$0 = 0 \times 9$$

Third property:

The sum of several number multiples also is a multiple of that number.

We consider two multiples of 4. For example, 60 and 12. If you add $12 + 60 = 72$, the number you get, 72, is also a multiple of 4, because $72 = 4 \times 18$.

- $60 \div 4$ because $60 = 4 \times 15$
- $12 \div 4$ because $12 = 4 \times 3$
- $72 \div 4$ because $72 = 4 \times 18$





Fourth Property:

The difference of two multiples of a number is a multiple of that number.

Subtracting 12 from 60 which are multiples of 4, we have $60 - 12 = 48$.

The number you get, 48, also is a multiple of 4 since $48 = 4 \times 12$.

- $60 \div 4$ because $60 = 4 \times 14$
- $12 \div 4$ because $12 = 4 \times 3$
- $48 \div 4$ because $48 = 4 \times 12$

Fifth Property

If a number is a multiple of another one, than all multiples of the first one are multiples of the second number.

Think about the number 15, which is a multiple of 5. Multiplying 15 by a number, for example 4, we obtain 60, which is another multiple of 5, since $60 = 5 \times 12$

- $15 \div 5$
- Since $60 \div 15$, also $60 \div 5$ is true.

