Beads-On-A-Wire

Colegiul Național Gheorghe Lazăr Sibiu, Romania - 2018

6th grade students

STEM Alliance
inGenious education & industry

World Space Week
October 4 - 10

We are 6th grade students learning at Colegiul National Gheorghe Lazar in Sibiu, Romania, and we are happy to be here to present to the world our project entitled “Beads on a Wire”.

We are surrounded by numbers,
and at times we need to group them,
or do calculations...


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There are people for whom calculations seem hard and tiring...


SCI-FI


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There are other people for whom calculations appear easy and pleasant...


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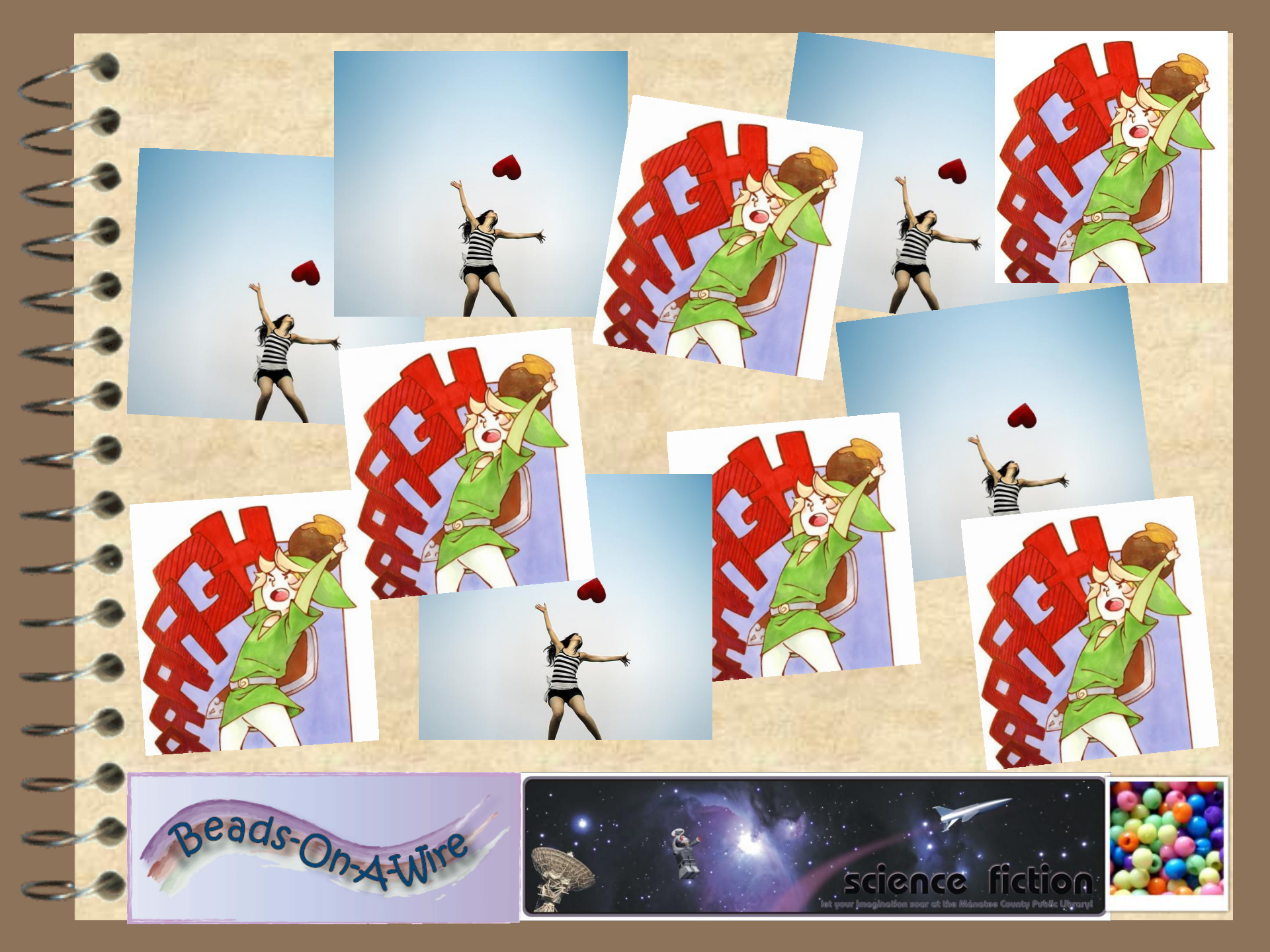
This is just how things are.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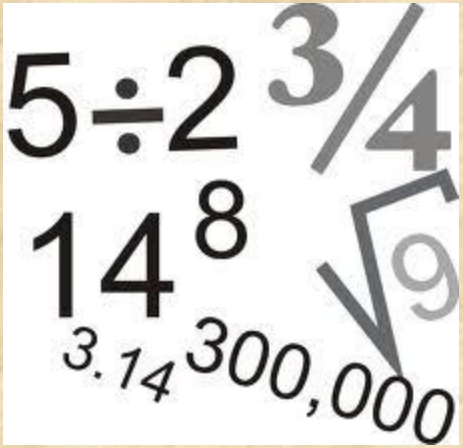
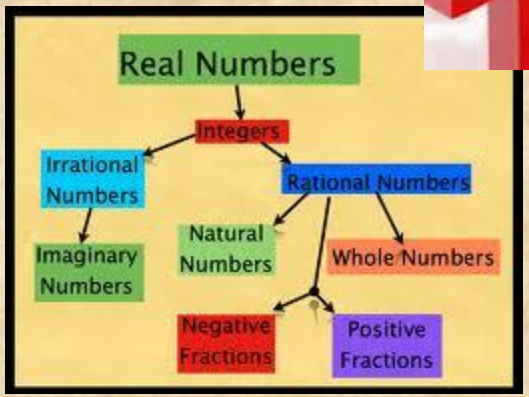
Some people enjoy arithmetic.
Others add, substract, multiply, divide because they need to.

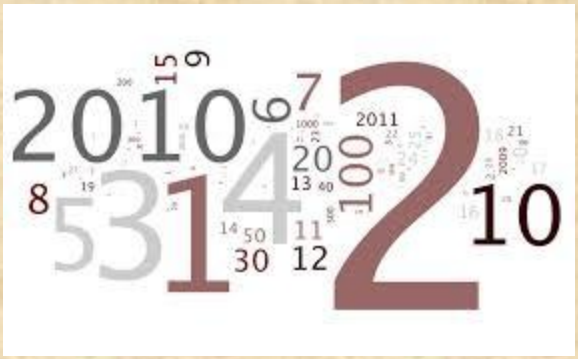
All people on Earth have at some point used numbers and done sums,…


5÷2
3/4
14 8
√9
3.14
300,000


THINKSTOCK


Real Numbers
Integers
Irrational Numbers
Rational Numbers
Imaginary Numbers
Natural Numbers
Whole Numbers
Negative Fractions
Positive Fractions


37%
100 TO 34
91.8%
-99.6%
$6.5
BILLION


2010
2011
2012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...even if it was just when putting together
two pebbles for instance
and noticing that
one plus one equals two.


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We have played with numbers
in our English classes,
and liked them,
even loved them!

Here comes our recipe!

The English Class!

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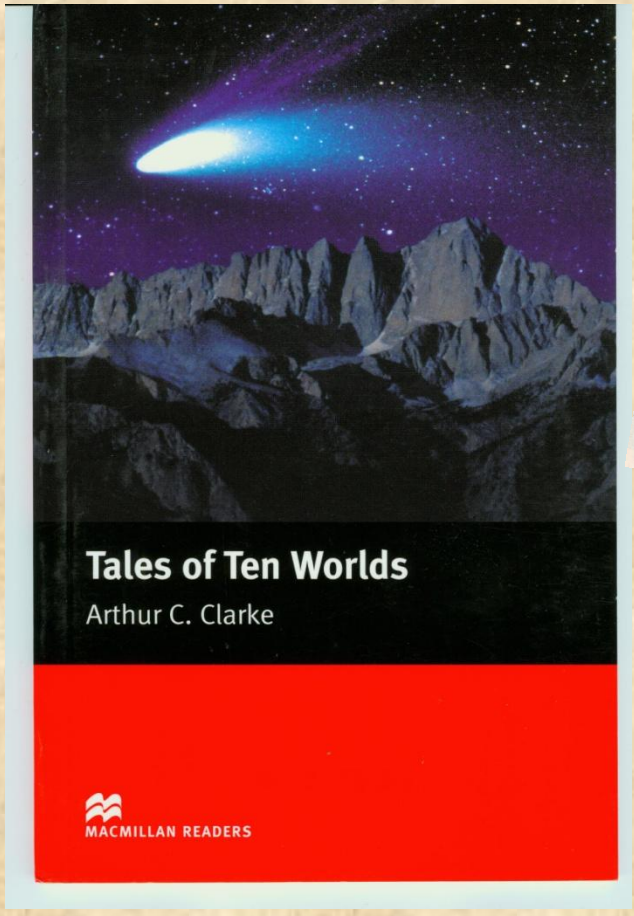
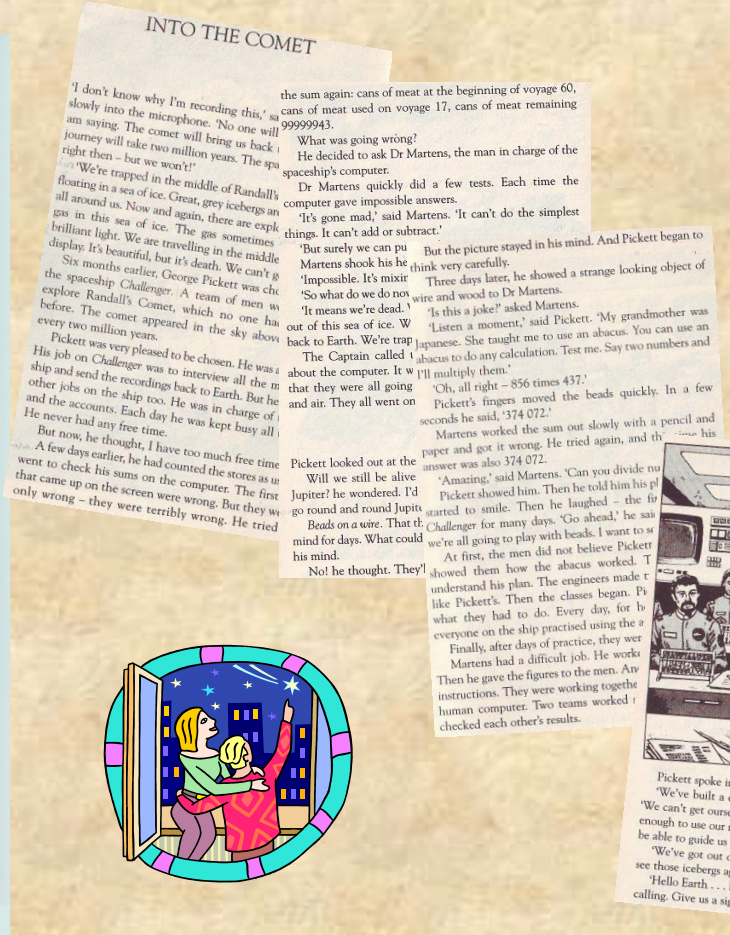
We started with facts about our Solar System.

About our Solar System

Then we read the story entitled “Into the Comet”
written and published in 1960
by science-fiction writer Arthur C. Clarke.

Arthur C. Clarke's "Into the Comet"



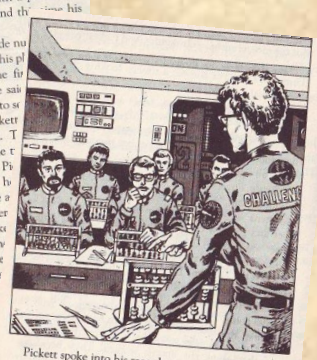

INTO THE COMET

'I don't know why I'm recording this,' sa
slowly into the microphone. 'No one will
am saying. The comet will bring us back
journey will take two million years. The spa
right then – but we won't!'
'We're trapped in the middle of Randall's
floating in a sea of ice. Great, grey icebergs an
all around us. Now and again, there are explo
gas in this sea of ice. The gas sometimes
brilliant light. We are travelling in the middle
display. It's beautiful, but it's death. We can't g
Six months earlier, George Pickett was cho
the spaceship *Challenger*. A team of men w
explore Randall's Comet, which no one ha
before. The comet appeared in the sky abov
every two million years.
Pickett was very pleased to be chosen. He was a
His job on *Challenger* was to interview all the m
ship and send the recordings back to Earth. But he
other jobs on the ship too. He was in charge of
and the accounts. Each day he was kept busy all
He never had any free time.
But now, he thought, I have too much free time
A few days earlier, he had counted the stores as u
went to check his sums on the computer. The first
that came up on the screen were wrong. But they w
only wrong – they were terribly wrong. He tried

the sum again: cans of meat at the beginning of voyage 60,
cans of meat used on voyage 17, cans of meat remaining
99999943.
What was going wrong?
He decided to ask Dr Martens, the man in charge of the
spaceship's computer.
Dr Martens quickly did a few tests. Each time the
computer gave impossible answers.
'It's gone mad,' said Martens. 'It can't do the simplest
things. It can't add or subtract.'
'But surely we can pu
Martens shook his he
'Impossible. It's mixir
'So what do we do no
'It means we're dead.
out of this sea of ice. W
back to Earth. We're trap
The Captain called
about the computer. It w
that they were all going
and air. They all went on

Pickett looked out at the
Will we still be alive
Jupiter? he wondered. I'd
go round and round Jupit
Beads on a wire. That th
mind for days. What could
his mind.
No! he thought. They'l

But the picture stayed in his mind. And Pickett began to
think very carefully.
Three days later, he showed a strange looking object of
wire and wood to Dr Martens.
'Is this a joke?' asked Martens.
'Listen a moment,' said Pickett. 'My grandmother was
Japanese. She taught me to use an abacus. You can use an
abacus to do any calculation. Test me. Say two numbers and
I'll multiply them.'
'Oh, all right – 856 times 437.'
Pickett's fingers moved the beads quickly. In a few
seconds he said, '374 072.'
Martens worked the sum out slowly with a pencil and
paper and got it wrong. He tried again, and th
answer was also 374 072.
'Amazing,' said Martens. 'Can you divide nu
Pickett showed him. Then he told him his pl
started to smile. Then he laughed – the fir
Challenger for many days. 'Go ahead,' he sai
we're all going to play with beads. I want to s
At first, the men did not believe Pickett
showed them how the abacus worked. T
understand his plan. The engineers made t
like Pickett's. Then the classes began. Pi
what they had to do. Every day, for h
everyone on the ship practised using the a
Finally, after days of practice, they wer
Martens had a difficult job. He worke
Then he gave the figures to the men. An
instructions. They were working togethe
human computer. Two teams worked
checked each other's results.



Pickett spoke into his recorder.
'We've built a computer out of human beings,' he said.
'We can't get ourselves back to Earth. But we can get near
enough to use our radio. Then the computers on Earth will
be able to guide us back.
'We've got out of the comet already. I'm glad we won't
see those icebergs again.'
'Hello Earth . . . hello Earth,Can you hear us? *Challenger*
calling. Give us a signal. We're coming home!'

After this, the play with numbers began!

Play with Numbers

1 Favourite Numbers

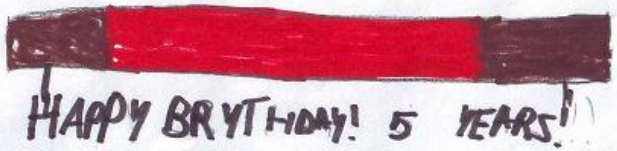
2 The Abacus

3 In Our Solar System

First, we decided on our favourite numbers.
Everybody has a favourite number!
To make it smoother, we decided to think about favourite numbers from 2 to 12.
Each of us stated their reasons for liking that particular number.
The number was our age,
or the number of siblings,
or the birthday, or the number of pets,
or the number on the basketball T-shirt,
or the age of a little brother…

1 Favourite Numbers

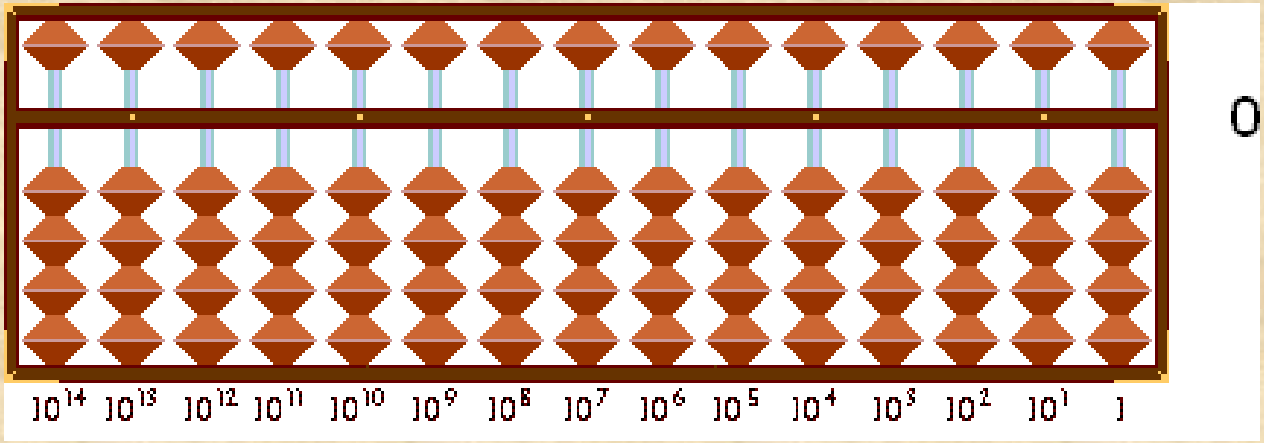
My favourite number is 5. Because my brother age is 5 years.



Then we started working
around an ancient calculation tool,
that beads-on-a-wire thing,
and loved being abacists!

We used representations of the Japanese abacus,
and learnt how to write numbers and do sums!

2 The Abacus


0
10^{14} 10^{13} 10^{12} 10^{11} 10^{10} 10^{9} 10^{8} 10^{7} 10^{6} 10^{5} 10^{4} 10^{3} 10^{2} 10^{1} 1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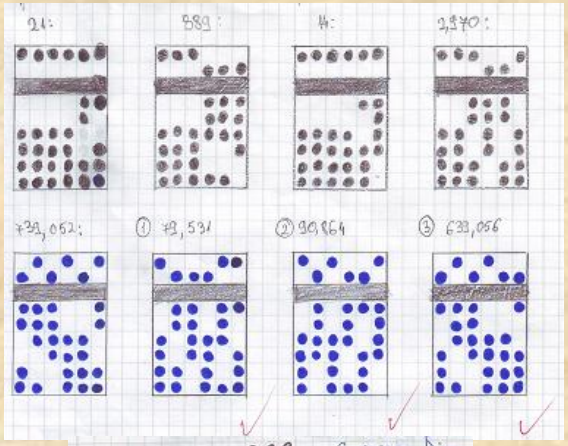
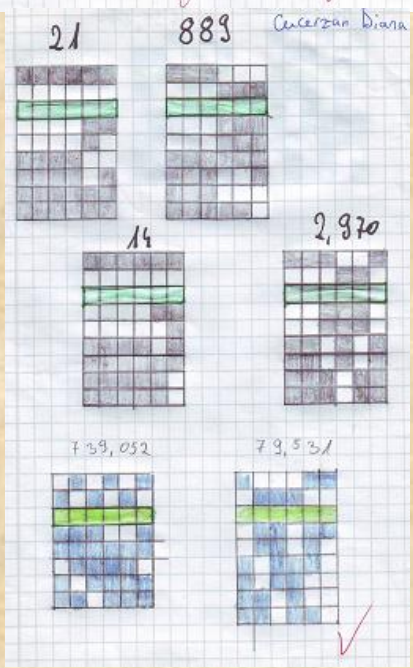
Here are some of our worksheets, and how we wrote the numbers:


21:
889:
14:
2,970:
739,052:
① 79,531
② 30,864
③ 639,056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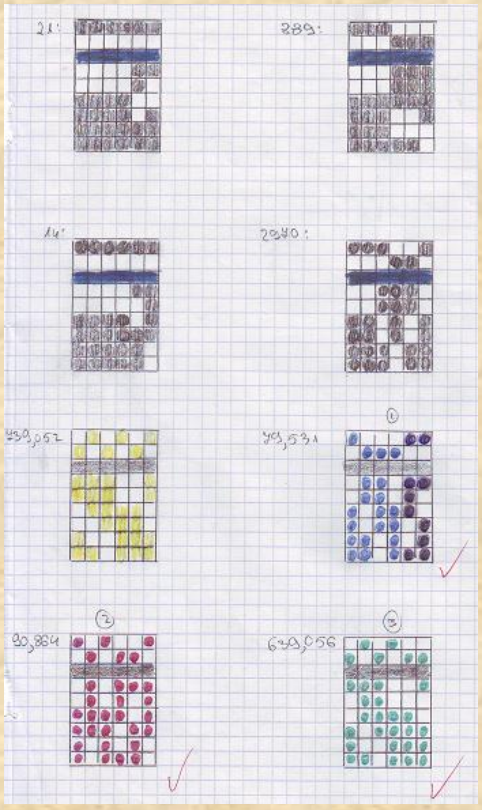
889
Cucerzan Diana
14
2,970
739,052
79,531


21:
889:
14:
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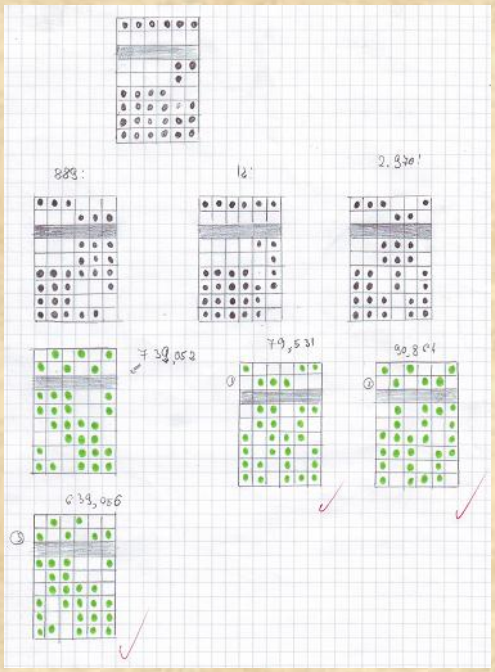
739,052
79,531
30,864
639,056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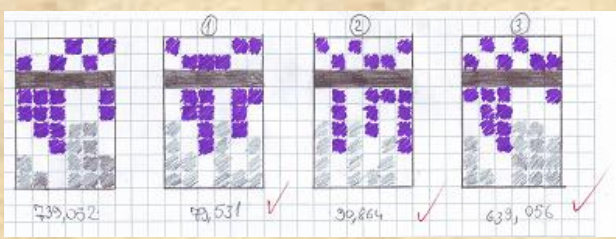
2,970:
739,052
79,531
30,864
639,056


739,052
79,531
30,864
639,056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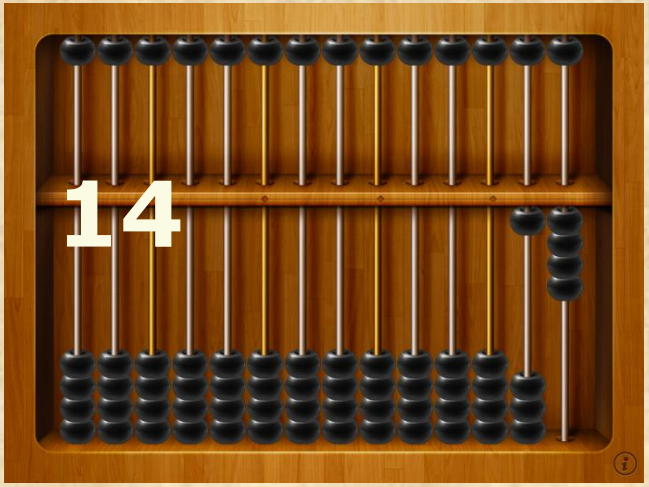
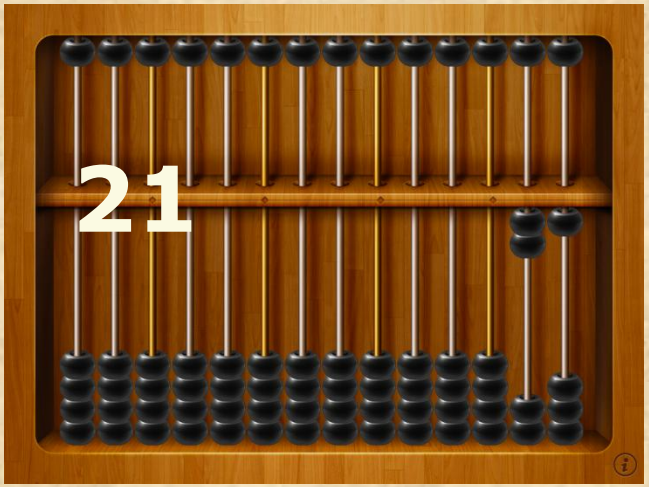
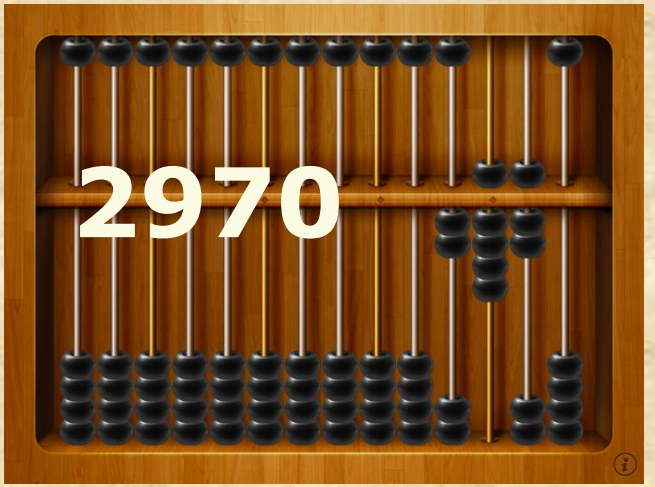
Here are numbers:


14


889


21


2970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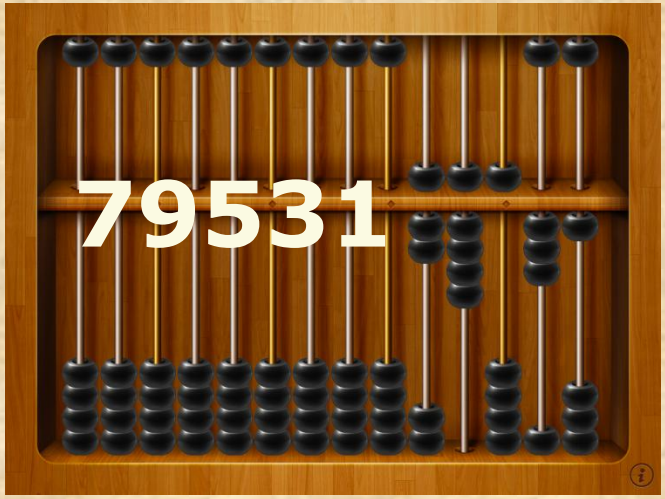
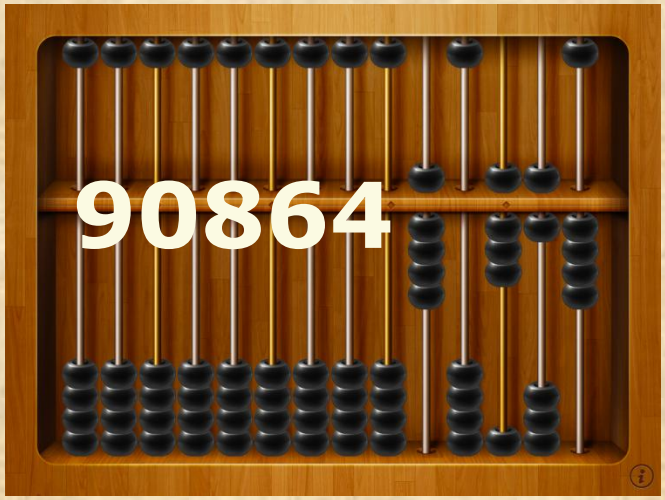
And even bigger numbers now:


79531


639056


90864


739052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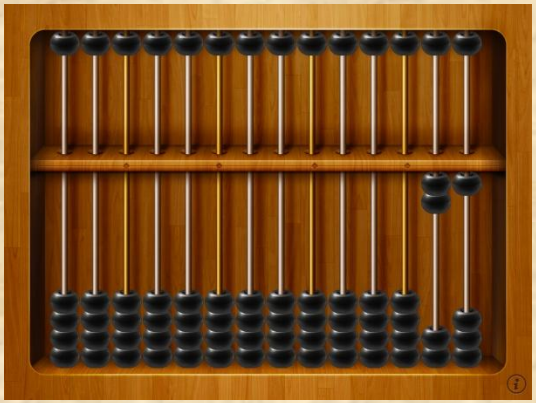
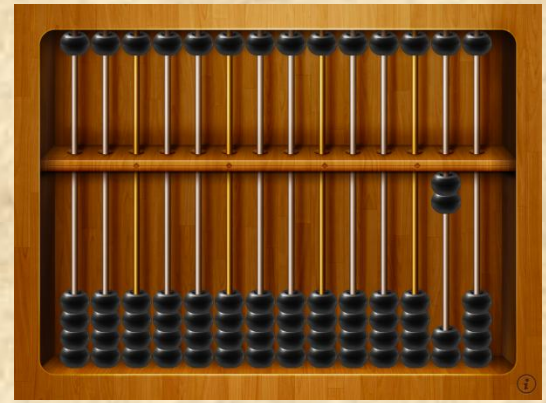
And now a simple sum:
twenty-one plus fourteen equals thirty-five:

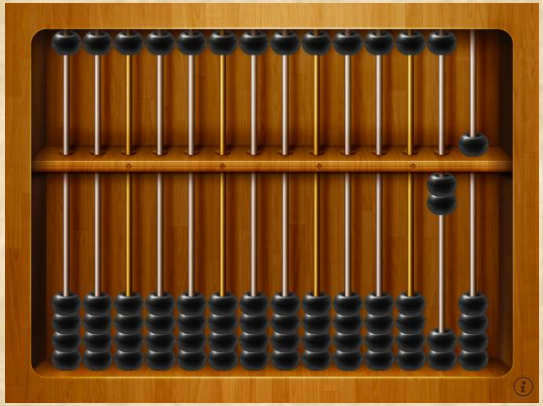
21+14=35



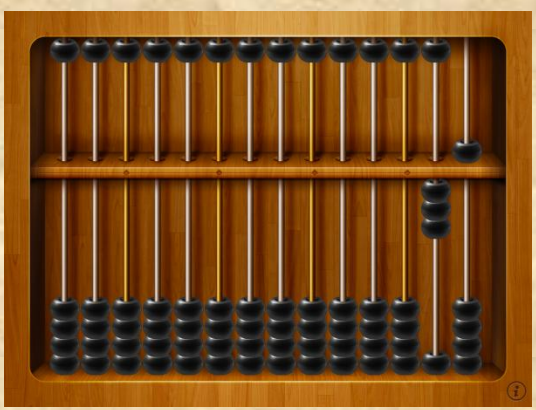
21



-1



+5



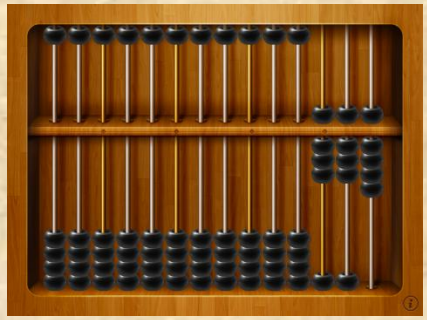
+10

=35

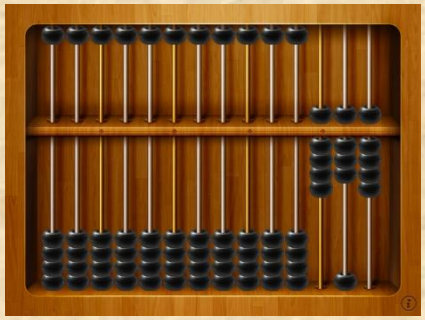
And now a more complicated one –
still simple for us good abacists!

Eight hundred and eighty-nine
plus two thousand nine hundred and seventy
equals three thousand eight hundred and fifty-nine.

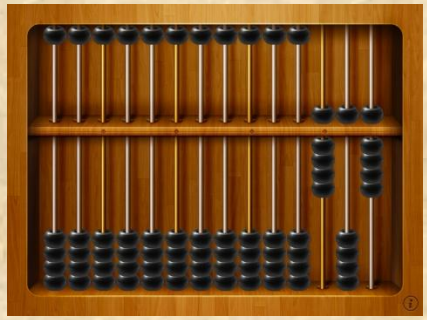
889+2970=3859



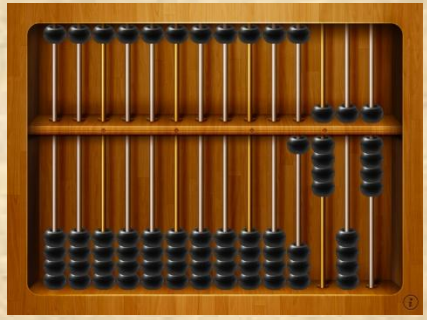
889



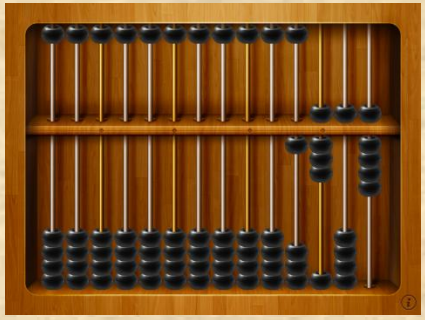
+100



-30



+1000



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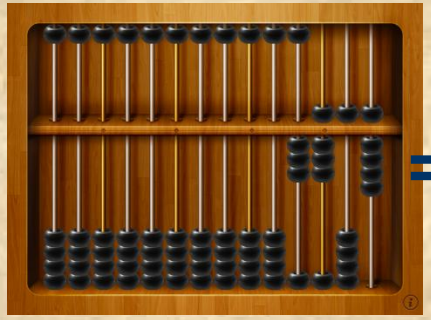


+2000

=3859

We just loved this games of beads on wires!

The information that we found out
about our Solar System was also put into numbers
in activities on the main website of the project.
The main exercise is a text
where empty spaces need to be filled in,
most of the times with the right numbers!
Here is an example about how long
it takes each planet in our Solar System
to go round the Sun:

3 In Our Solar System

6. The planet closest to the Sun is [?].

7. Which planet do you think is the hotter, Mercury or Neptune? - [?].

8. Which planet do you think takes the longer amount of time to revolve around the Sun, Mercury or Neptune? - [?].

The length of a year of each planet in our Solar System is the period of time it takes the planet to complete one full revolution around the Sun. No two planets in the Solar System have the same year length.

Task 4: Indicate the length of a year in Earth days or years for the planets in our Solar System.

MERCURY: 87.9 Earth days, [?] Earth years.

VENUS: 224.7 Earth days, [?] Earth years.

EARTH: 365.26 Earth days, 1 Earth year.

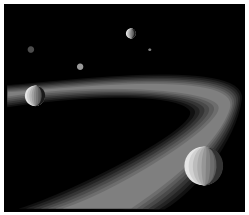
MARS: 686.9 Earth days, [?] Earth years.

JUPITER: [?] Earth days, 11.86 Earth years.

SATURN: [?] Earth days, 29.45 Earth years.

URANUS: [?] Earth days, 84 Earth years.

NEPTUNE: [?] Earth days, 164.78 Earth years.



The eight planets of our Solar System can be classified into two main groups according to their size and composition. There are four small solid planets - they are called terrestrial - and four giant planets composed of gases.

The eight planets in our Solar System vary in size. The largest, most massive planet is Jupiter. Saturn is the second largest planet. Mercury is the smallest planet. Uranus and Neptune are close in size. Venus and Earth are close in size.

Task 5: Read the information below.

MERCURY - diameter in kilometres: 4,870;

VENUS - diameter in kilometres: 12,100;

Numbers are special, numbers are magical.

Counting pebbles,
moving beads on a wire,
using a computer,
saving or spending money –
numbers are everywhere.

It is up to us to employ them well.

Beads and Numbers

http://beadsonawire.weebly.com/

Colegiul Național Gheorghe Lazăr Sibiu, Romania - 2018