

„SHEHEREZADA’S NUMBER“ - 1001



Not only the number 1001 is not prime, it has even 3 prime factors: 7, 11 and 13.

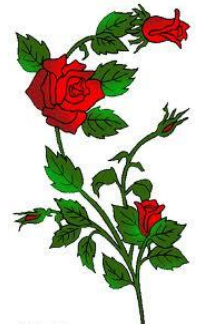
Using that fact we can make many interesting problems.

$$1001=7 \cdot 11 \cdot 13=7 \cdot 143$$

$$D_{1001}=\{1, 7, 11, 13, 77, 91, 143, 1001\}$$

Yet another interesting number is **111**. It has prime factors **3 and 37**.

$$\text{Moreover, } 10101=3 \cdot 7 \cdot 13 \cdot 37$$



- 1) A gardener planted 1001 roses in rows in his seven identical gardens. How many roses did he plant in a single row if we know that number of roses in each row is the same and larger than the number of rows in a garden?
- 2a) Prove that the sum of the first 1000 integers is divisible by 143.
- b) Prove that the sum of the first 1000 integers is divisible by 77.
- 3) When we write the same three digit number twice (without space in between), we obtain a six digit number which is divisible by 7, 11 and 13. Prove!
- 4) Decode the following multiplication: $BAO \cdot BA \cdot B + B = 2003$
- 5) Prove that the number written by three identical digits is divisible by 37.
- 6) Decode the following multiplication: $x \cdot y \cdot xy = yyy$
- 7) A product of two two digit numbers is written only using digit 4. What are these two digit numbers?
- 8) A two digit number is written three times in a row (for example 525252). Prove that the obtained six digit number is divisible by 3, 7, 13 and 37.

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Notes and comments:

The lecture can start with an introductory talk about numbers.

Connections between numbers are often mysterious and unusual. As we learn Mathematics we will often encounter different unusual and fascinating facts about numbers and their properties.

The numbers are present from time immemorial, both in personal and social history. However, philosophically the concept of number is a complex one.

In school we deal with the following: counting, relations between numbers, arithmetic operations, classifying numbers into categories – odd and even, prime and composite.

What are prime numbers? What are composite numbers? Factoring out prime numbers; 2, 3, 5, 7...

Factorization of 2010; 101 is a prime number, the largest prime we use in factorization, factorization of 111 and 1001

1001 – magical or Sheherezada' s number, number from 1001 nights

„One thousand and one night“ is a collection of stories by different authors, consisting of more than 300 fairy tales, amusing stories, legends and anecdotes. Among these well known are: Sinbad's adventures, Aladin's magic lamp and Ali Baba and 40 thieves.

In times long, long ago in the city of Samarkand lived a powerful king Shahriar who was cheated by his wife. Enraged, he killed his wife and ordered that each night a young girl should be brought to him, so that she can be executed next morning. One night a beautiful and smart Sheherezada was brought to the king. She was not an ordinary girl, she knew 1001 exciting stories and occupied the attention of the king. In that way she evaded her fate. She would begin a story every night, and would not finish it the same night. So the story continues the next day, she begins the new story and so on...

When discussing problem 4) talk about Baobab tree.

Baobab is a tree that originated from Madagaskar, from Afrika and Middle East. There are eight variations of this tree, six of them are on the island of Madagaskar. It has a rare ability to storage water inside the trunk. Some botanist claim that the Baobab can reach age of several thousand years.

Baobab is the national symbol of Madagaskar.



Little prince had to clean his planet from the seeds of Baobab trees, he could not allow it to grow and destroy his tiny planet by its roots.

The same goes with ideas. As soon as a negative idea appears it should be uprooted and thrown out of the mind.

Homework:

- Write down a short paragraph on the city of Samarkand and find it on a map.
- Read at least one of the famous stories from 1001 nights.
- In how many ways one can represent 2002 as a product of three integers, the first one being one digit number, the second one two digit number and the third one three digit number. Explore all the possibilities.