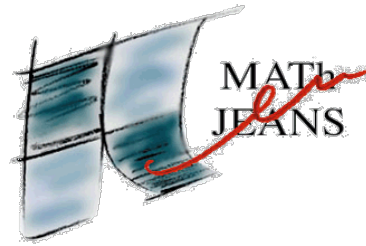




Erasmus+



Researcher seeds workshop 2017-2018
Erasmus+ project Mathematics and languages :
twinning of Lycée Arago (Perpignan, France)
and Colegiul B.P. Hasdeu (Buzău, Romania)

14h-15h:

- Presentation of the project : Clara, Guilhem, Axel, Tristan, Jeanne, Loriane
- We get 2017: Yohan, Kewan, Sarah-Lou, Maëlys, Gaëlle:

At the beginning you only have an empty blackboard. At each step you can either write twice the number 1 on the blackboard or delete two numbers equal to n already written and replace them by $n - 1$ and $n + 1$.

How many steps at least will be necessary in order to reach the number 2017?

- A special sequence: Ugo, Damien

A sequence of integers is defined by $a_1 = 2$, $a_2 = 3$ and, for each $n \geq 2$:

either $a_{n+1} = 2a_{n-1}$ or $a_{n+1} = 2a_n - 3a_{n-1}$.

Can that sequence reach any of the following numbers: 17 ? 21 ? 1600? 1536 ? 2017 ?

15h-16h :

- Presentation of the project : Clara, Guilhem, Damien, Yohan, Paul-Louis

- A colored polygon : Jeanne, Loriane :

A convex N -gone is divided into triangles by its diagonals (assuming that 3 diagonals never intersect in the same point). The triangles are colored in red and in blue so that two triangles with a common side always have different colors. Find, in terms of N , the greatest possible value of the difference between the amount of red triangles and the amount of blue ones.

- Very hot : Noryne, Cassandra :

A big Christmas party is organized. Every guest must bring a gift and leave it into a big basket when they arrive. Around midnight, Santa offers a present from the basket randomly to each guest. Ideally, everyone should get a present different from the one they brought (we assume that all the gifts are different). What is the chance that it actually happens?

16h-17h :

- Presentation of the project : Adèle, Cassandre, Damien, Paul-Louis
- To each his own mania : Clara, Axel, Tristan, Guilhem:

You are fond of counting, it is almost a mania. When you see a number, you add its digits up and, if this sum divides the number you started with, you feel good! How often does it happen?

- Fractions with a nice profile: Inès P.

A positive fraction is said to have a nice profile if it can be written as a sum of other fractions, all different, each one of the form $\frac{1}{p}$ with p a positive integer.

For instance, the fraction $\frac{5}{6} = \frac{1}{2} + \frac{1}{3}$ has a nice profile.

There are a lot of questions that can be asked about that topic. For example, which fractions have a nice profile? Is it possible to find general and automatic methods to write any given fraction in this way? If a fraction has a nice profile, how many ways are there to break it down? What if we are interested in sums of two fractions only? etc...

17h-18h :

- Presentation of the project : Clara, Ugo, Gaëlle
- A bright idea : Claire, Paul-Louis

The walls of a room are all mirrors. A ray of light is sent parallel to the floor from a given point in the room. Which possible trajectories of the light can we observe depending on the original direction and the shape of the room?

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